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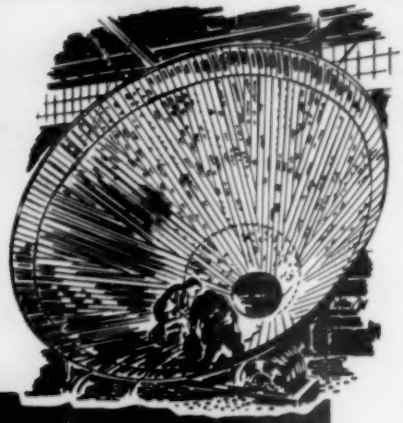

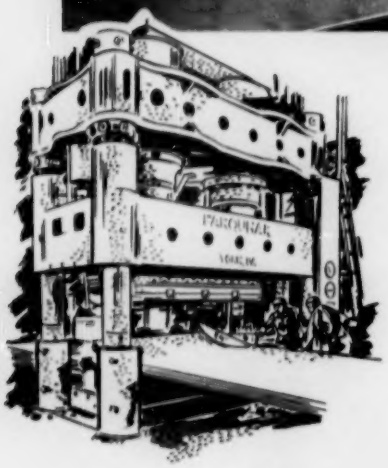

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DECEMBER 13, 1954 VOL. 53 NO. 32

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In Brief . . .

1. FASTER DRILLING . . . While there is no single factor which accounts for today's phenomenal drilling rates in deep wells, the advances in drilling-fluid technology are responsible for an important part. Too, vastly improved completions are being made in many areas because the importance of having suitable fluid in contact with pay formation is recognized.

This four-article symposium deals with these subjects: (1) Stanolind's new fluid. This multi-purpose water-in-oil-emulsion mud is very successful. (2) The mud developed to solve the casing-collapse problem that has been assuming disastrous proportions in the Williston basin. (3) Stopping Gulf Coast hole troubles before they start by using low-solids mud. (4) A new nonfluorescing-emulsion drilling fluid that doesn't interfere with examination of cuttings and cores.

2. AMMONIA ADVANCES . . . Lion Oil's Barton ammonia plant incorporates a number of features which lead to more efficient and more economical operations. Among these are: (1) improved lube-oil-recovery facilities; (2) substitution of aqua-ammonia for caustic wash in the purification section; (3) an improved recompression system used in storing ammonia; (4) plant is more compact; (5) with exception of compressor plant and control room, the plant is constructed outdoors.

3. PIPELINE BLOWDOWNS . . . Proper design of gas-pipeline blowdowns is very important since the jet which issues from them causes a violent opposing thrust. Blowdown time is also of considerable importance. The size of the blowdown branch can and should be calculated to meet the desired exhaust time.

4. IMPROVED OPERATIONS . . . The mass spectrometer has proved an invaluable aid in improving operations at the Wilmington, Calif., refinery of Richfield Oil Corp. It is used in control of operating units, compiling information for the accounting department, in trouble shooting where operating units are in difficulty, in evaluating efficiencies of various processes, and air pollution work.

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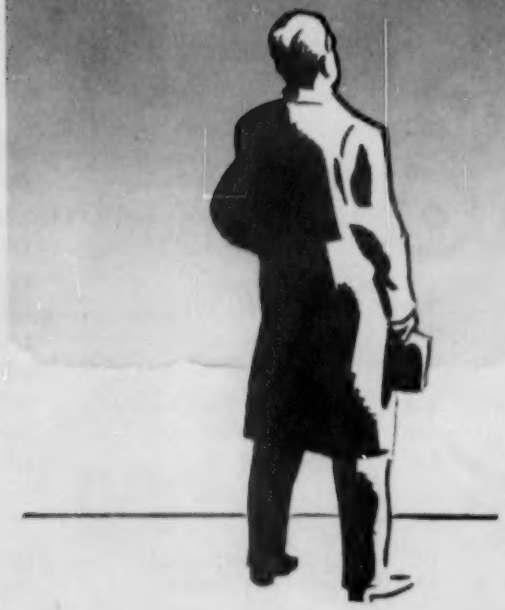

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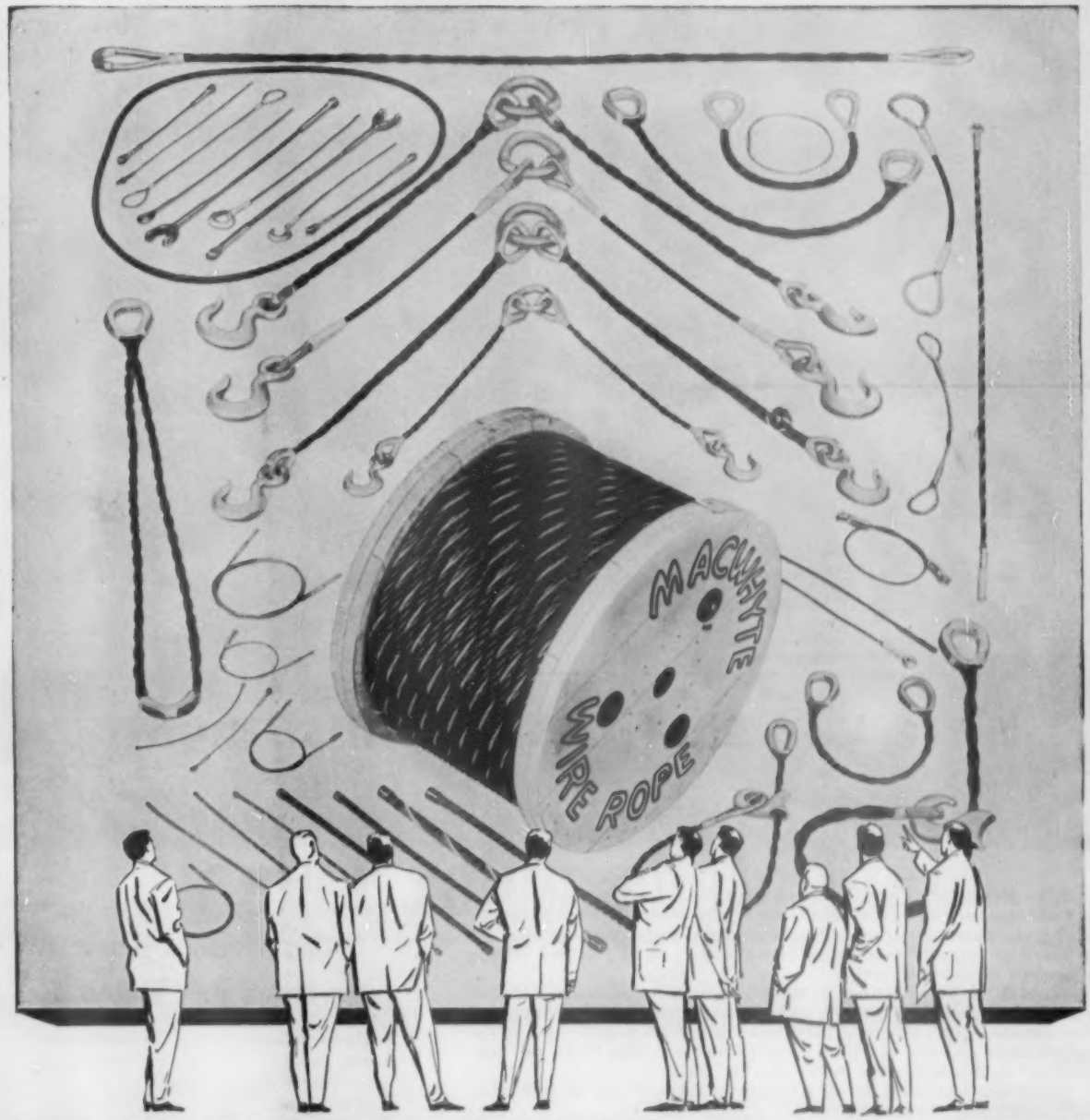

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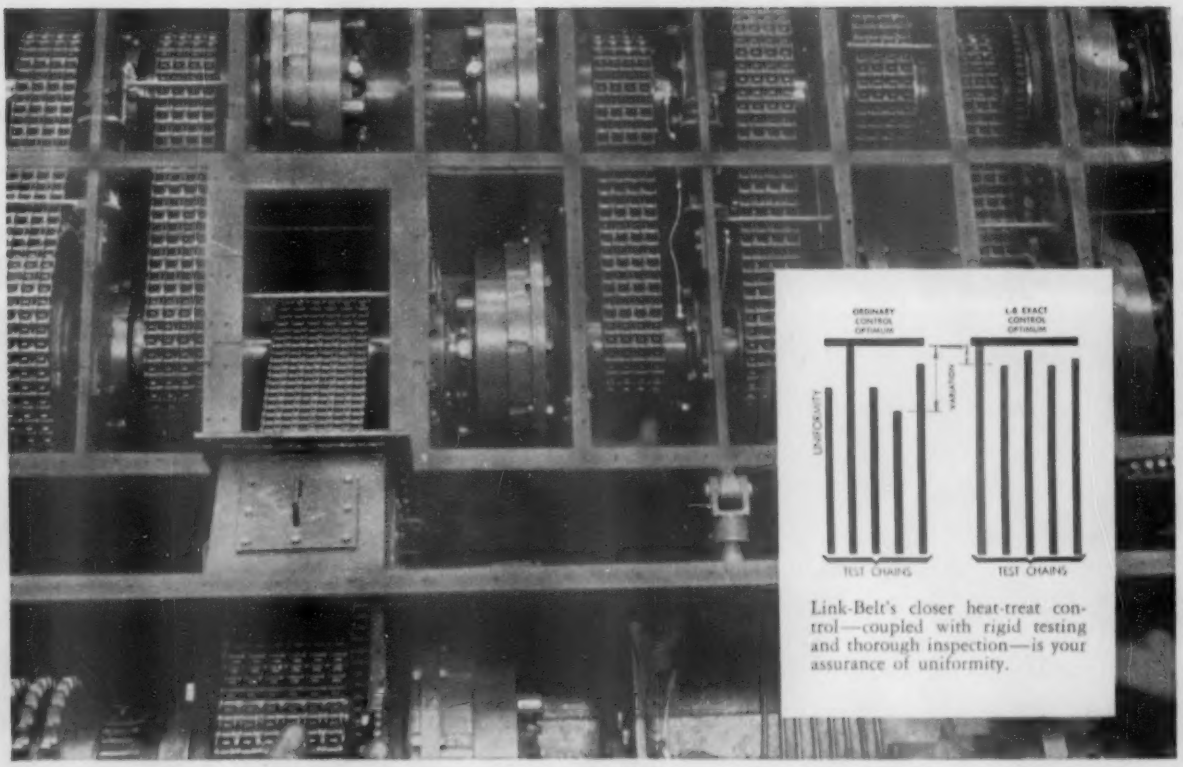

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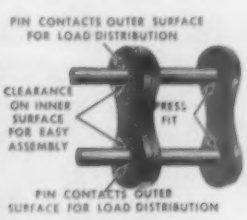
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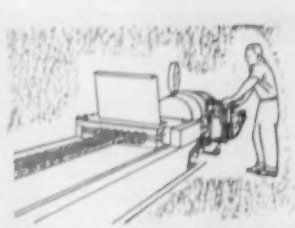

The pre-stressing of multiple width chain assures uniform load distribution.

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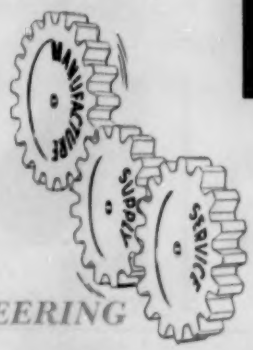

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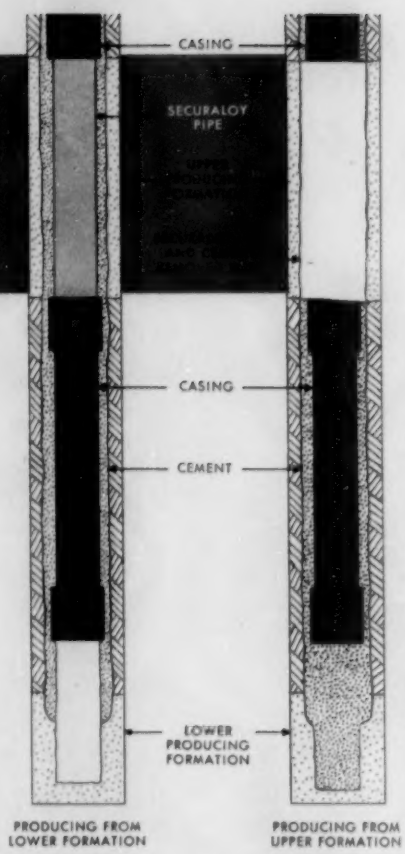
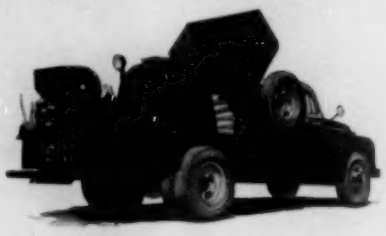


USE AND REMOVAL OF SECURALOY PIPE



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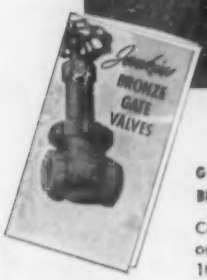

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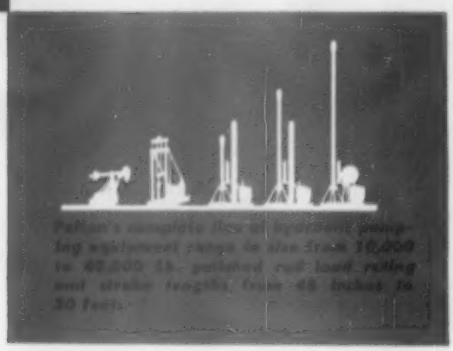

Pelton's complete line of hydraulic pumping equipment ranges in size from 10,000 to 40,000 lb. polished rod load rating and stroke lengths from 48 inches to 30 feet.

PELTON WATER WHEEL COMPANY

Subsidiary of Baldwin-Lima-Hamilton Corp.
Oil Industry Machinery Division

2447 East 54th Street, Los Angeles 58, California

Los Angeles · San Francisco · Avenal · Dallas · Houston · Odessa · Hobbs · New York City

Pioneers in hydraulic pumping equipment for the oil industry.

6 Reasons why A GAULIN TRIPLEX PUMP can make money for you...

1. Horizontal design of this hydraulic pumping unit completely separates cylinder from crankcase, preventing any product leakage to crankcase.

2. Plexiglas well covers give an instant visual check of cylinder plunger and packing operation.

3. Corrosion-proof cylinder is made of stainless. Hardened stainless or ceramic plungers available.

4. Spring-loaded plunger packing is self-adjusting, self-sealing, eliminating the human element.

5. API ball valves and removable seats permit quick adjustment in the field.

6. Wide volume and pressure ranges are provided by Gaulins because plunger sizes and drive speeds can be quickly changed in the field.

Gaulin TRADE MARK

Manton-Gaulin
MANUFACTURING CO., INC.
EVERETT, MASSACHUSETTS

— sold: SPECIALTY SALES & SERVICE, INC.
Tulsa, Oklahoma — (Tulsa 5-42226)
Odessa, Texas — (Odessa 6-6921)

MANTON-GAULIN MANUFACTURING CO., INC.
LA HABRA, CALIFORNIA
M. Les Walraven, Mgr. Oil Field Sales
(Oxford 7-6334)
(Long Beach 4-1596)

Mr. 'H' was excited . . .

Mr. H. was excited. He had the oil deal to end all deals. And he was no child when it came to such oil deals. It was a good deal. Mr. H. believed in its success for he had unbounded faith and optimism in his own ability to make it come out as he had planned. He had everything ready for us, and we could hardly keep him from signing right there and then.

We tried to slow him down, but he had the bit between his teeth and he was on the run. Finally we got him to listen, and we explained his deal to him from our point of view. We showed him the dangerous position he was needlessly putting himself in. Our faith in him was high, but we couldn't see a man put a noose around his own neck.

So we knocked off a lot of what he would have had to do. We brought his part down to what you could reasonably expect a man to do. We didn't lend him as much as he had wanted, but what we did lend him was fully adequate and on terms a great deal easier and more favorable to him than he had set up for himself.

We can do things like that because we know the oil business and we know the money business. Our advice is impartial and is based on a great deal of experience. So the chances are we can help you, too. That's why oil men *going up* come to the Oil Loan Department of The National Bank of Commerce.

E. O. BUCK, VICE PRESIDENT, OIL LOAN DEPARTMENT

THE NATIONAL BANK OF COMMERCE

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AVAILABLE JOHNSTON by AL CAPP

STOP!!-AN' WHISPER TH' WORDS AH IS DYIN' T' HEAR!!
YO' MEAN THEM THRILLIN' WORDS 'BOUT HOW WE JOHNSTONS DO TH' FINEST TESTIN' JOB, BECUZ O' TH' HYDRAULIC TESTER, THAT PREVENTS SHOCK T' FOR-MAY-SHUN, PIPE, AN' INSTRUMENTS!!
NO!!-THOSE EVEN MORE THRILLIN' WORDS, 'BOUT--
'BOUT HOW TH' HYDRAULIC TESTER GIVES YO' POSITIVE OPER-AYSHUN EV'RY TIME?-
PSST!!-AH THINKS SHE MEANS---
OH!!-NATCHERLY!!- MERRY CHRISMUS T' YO'!!
-AN' YO'!!
-AN' YO'!!
Gal Capp

C-549

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FORMATION AND CASING TESTING — JOHNSTON

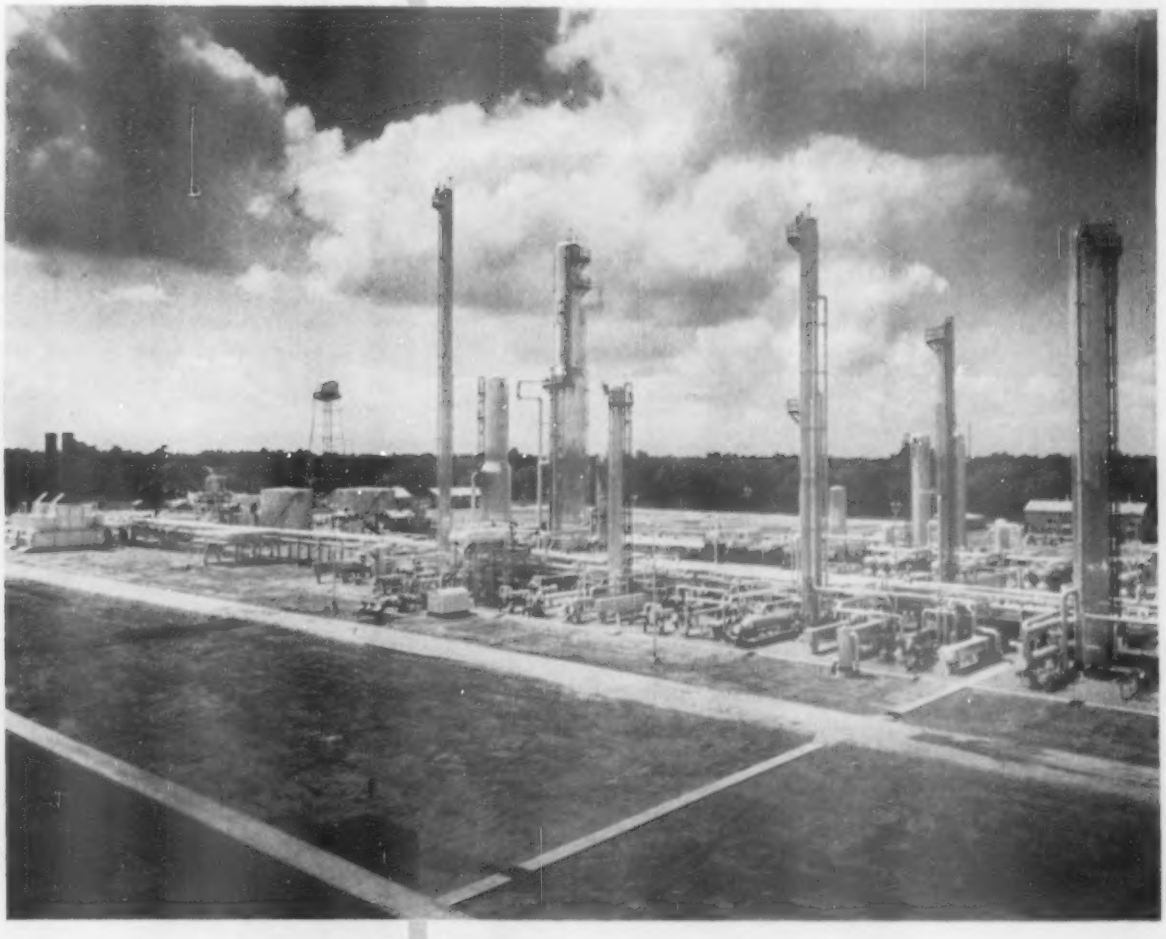
Take it up with
Stearns-Roger

The petroleum industry is a hard task master! Advancing technology imposes increasingly complex and difficult problems ...and a driving search for answers that meet both physical and economic requirements.

Over the years and to a greater and greater degree, the petroleum industry has proved to itself that in such cases it pays to "take it up with Stearns-Roger."

• • • • • • • • • • • • • •

Typical of Stearns-Roger engineering, design, and construction is this distillate plant in Texas recently put on stream. It processes, at 1350 p.s.i.g., 200 million cu. ft. of gas per day, with a total liquid product approximating 200,000 gallons per day. Plant was designed for 20% liquid ethane recovery and is producing in excess of design.



Take it up with Stearns-Roger

...for utmost efficiency in plants for natural gasoline extraction...sulphur recovery...gas sweetening...distillate recovery...gas compressor stations...packaged gas compressors ...chemical manufacture.

Stearns-Roger

THE STEARNS-ROGER MFG. CO. DENVER, COLORADO

DENVER • HOUSTON • EL PASO • SALT LAKE CITY • CALGARY

Only GRAPH-MO® gives you all three advantages in one tool steel

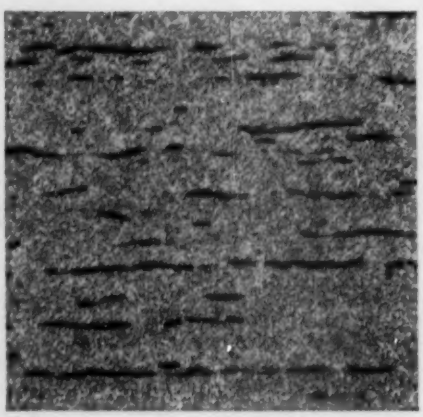
Wearability—*Outwears other tool steels 3 to 1*

Stability—*Is the most stable gage steel ever made*

Machinability—*Cuts machining time 30%*

YOU can make gages and dies that stay accurate longer and produce them in less time by using Graph-Mo® graphitic tool steel. That's because only Graph-Mo gives you the combination of wearability, stability and machinability that you want in a tool steel.

Free graphite and diamond-hard carbides in the structure of Graph-Mo steel give gages and dies extraordinary life. Reports from users show that Graph-Mo outwears other tool steels 3 to 1.



100X

In your plant, Graph-Mo steel will cut production time and rejects. Because of its graphitic structure, Graph-Mo steel machines 30% faster than other tool steels. This structure also gives excellent resistance to abrasion, and has minimum tendency to pick up, scuff or gall. Tests on Amsler Wear Machine show Graph-Mo has twice the resistance to galling when compared with ordinary tool steels.

The greater stability of Graph-Mo steel enables you to make gages that stay accurate longer. After 12 years of service, for example, a typical Graph-Mo steel master plug gage showed less than 10 millionths of an inch change from its original dimensions.

You can always tell Graph-Mo steel by its "graphitic look"—the tiny, scattered, parallel marks barely visible on the surface of a piece of polished Graph-Mo. This built-in "trade-mark", the result of free graphite in its structure, can't be duplicated in ordinary steels. The photomicrograph at left shows the free graphite and diamond-hard carbides that give Graph-Mo unusual wear resistance.

Write today for more information on Graph-Mo steel. The Timken Roller Bearing Company, Steel and Tube Div., Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

Packaged Compressor Plant

Lowest Cost Per Horsepower Installed

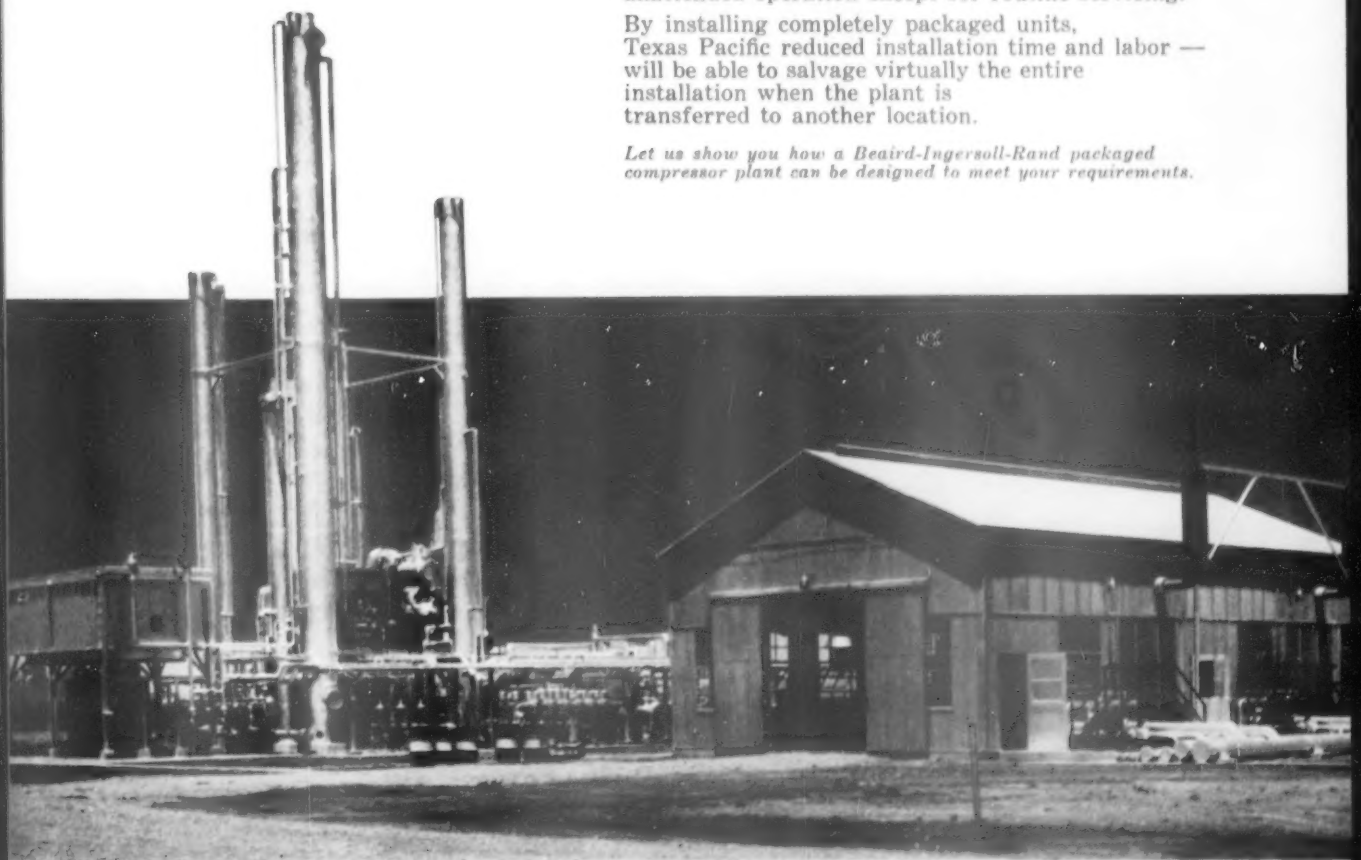
PACKAGED COMPRESSORS FOR GASOLINE PLANT

TEXAS PACIFIC COAL AND OIL COMPANY recently opened a compression-refrigeration type gasoline plant near Hamlin, Texas. The multiple compression tasks required in this process were entrusted to two 550 h.p. Beaird-Ingersoll-Rand packaged compressor plants. Each unit uses three stages to raise raw gas from 0 to 530 psig. The fourth cylinder compresses propane used as a refrigerant in the process. Plant vapors are collected and delivered into the sales line by a fifth cylinder added to one of the compressor plants.

To assure continuous operation, Texas Pacific installed two packaged units rather than one large compressor of equal horsepower. Plant pressures and operations can be maintained, when necessary, by one unit, while the other unit is shut down for maintenance or repair — with the loss of only a portion of the plant's total producing capacity. Automatic controls built into the units permit their unattended operation except for routine servicing.

By installing completely packaged units, Texas Pacific reduced installation time and labor — will be able to salvage virtually the entire installation when the plant is transferred to another location.

Let us show you how a Beaird-Ingersoll-Rand packaged compressor plant can be designed to meet your requirements.



Texas Pacific Coal and Oil Company's packaged compressor plant, Velta Plant, Fisher County, Texas—equipped with two Beaird-Ingersoll-Rand 550 h.p. 10 SVG FOUR CYCLE gas engine driven compressors, Young radiators and all necessary equipment and controls. Other sizes 110 to 660 h.p.

THE J. B. BEAIRD COMPANY, INC.

Shreveport, Louisiana

BEAIRD

MACHINING MANUFACTURING STEEL WAREHOUSE

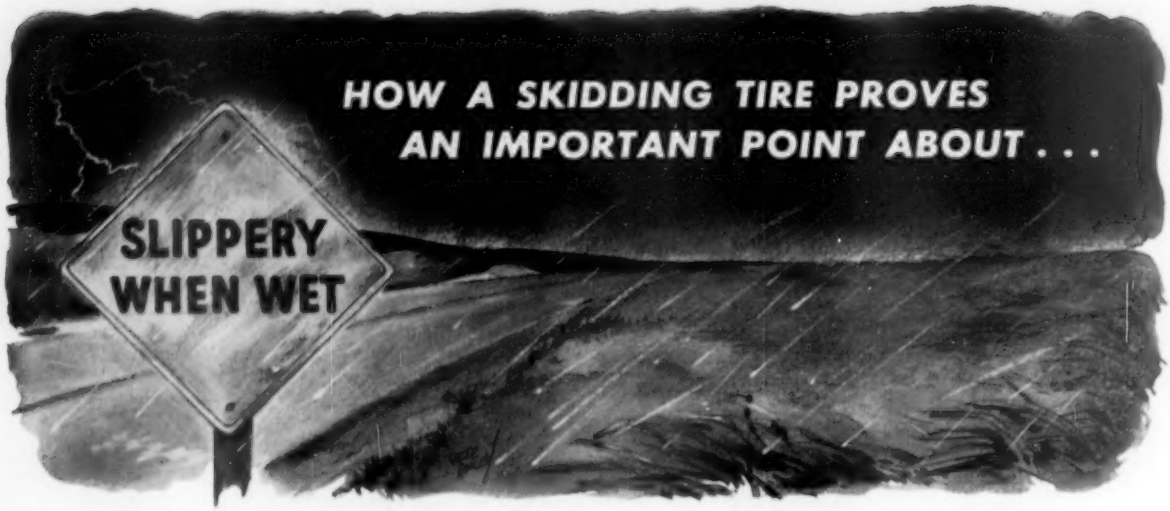
PACKAGED COMPRESSOR PLANTS

CAST STEEL FITTINGS

PRESSURE BULK STORAGE

ANHYDROUS AMMONIA EQUIPMENT

LP-GAS SYSTEMS



MARTIN PLUNGERS

You have a well with a high water content. Pumping that well is a worrisome, expensive headache. Those plungers you've been using just will not hold up. Expensive pulling jobs and repairs eat into your profits. Finally you start looking for an answer to the problem. And you find it . . .

You discover Martin Plungers

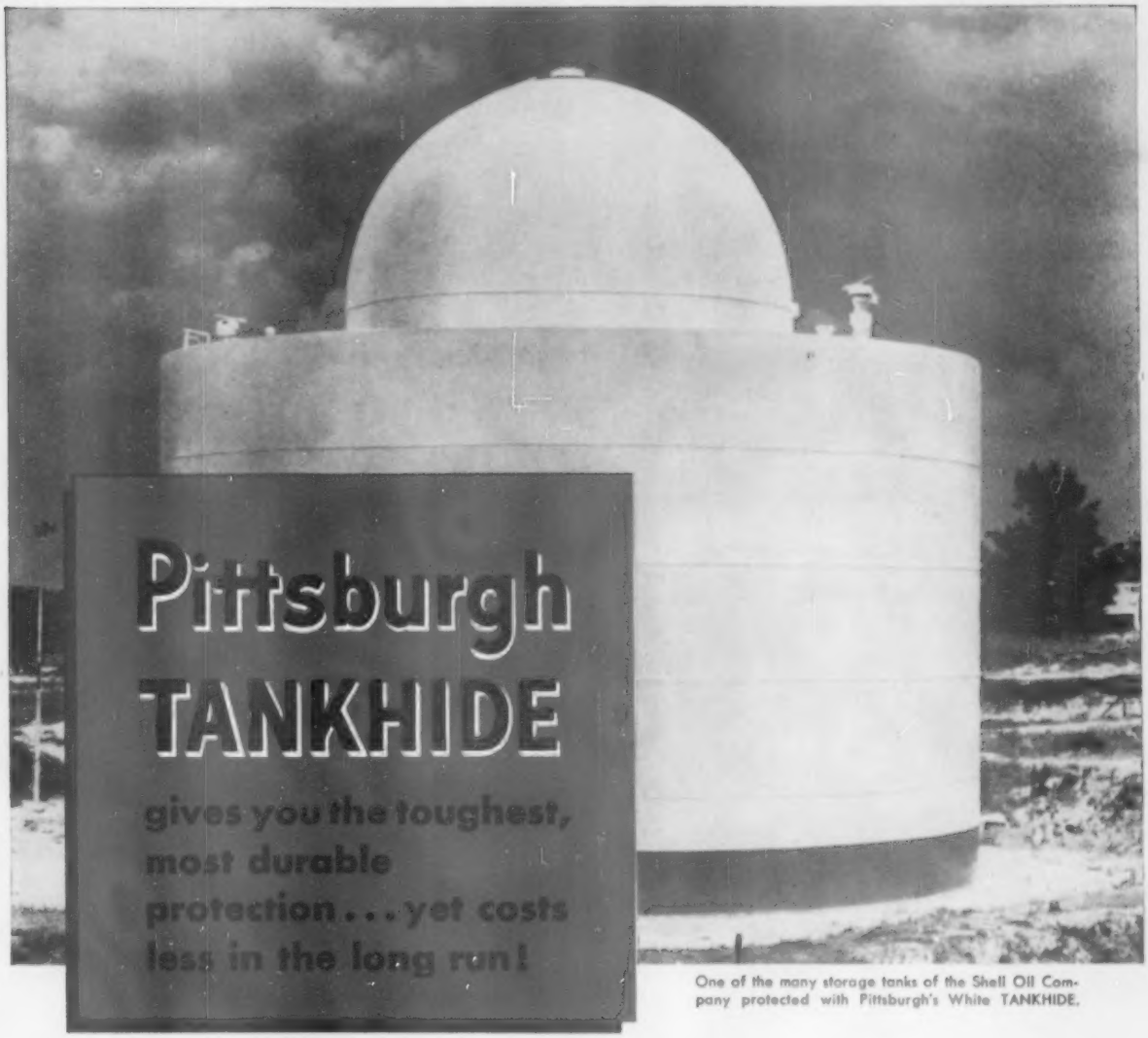
Why do Martin Plungers work so successfully in high water content wells when other plungers fail? . . . The answer is as simple as a skidding tire.

Water is a lubricant for rubber. And, since the Martin Plunger uses numerous split rubber and duck rings, the water content of the well actually serves as an efficient lubricant for the Martin Plunger. Where other plungers fail, the Martin Plunger goes on producing month after month.

The moment you start using Martin Plungers, your operating expense begins to drop. Pulling the pump for repairs becomes an exception rather than the rule. And, should it become necessary to repair your Martin Plunger, it may be repaired for ⅓ to ¼ the cost of a new plunger. Only the special split rubber and duck rings are replaced.

Your Martin Plunger also increases working barrel life—you will save up to 80% on barrel or tube cost due to the slow rate of wear. Yes, you discover Martin Plungers, and you discover real dependability and economy. See it at your supply store today.

JOHN N. MARTIN
Manufacturer
9 W. BRADY STREET • TULSA, OKLA.



One of the many storage tanks of the Shell Oil Company protected with Pittsburgh's White TANKHIDE.

IF IT'S TOUGHNESS, durability and low-cost protection you want for oil and gasoline storage tanks—Pittsburgh's TANKHIDE gives you what you're looking for.

Nothing is left to guesswork to make TANKHIDE a rugged and enduring finish highly resistant to the destructive effects of weather and corrosion. The materials that go into it—pigments, oils, resins, solvents and thinners—are all subjected to careful tests to make sure they measure up to rigid quality requirements. A series of constant and meticulous checks at every step in its making assure easy application, thorough hiding, quick drying, uniform texture and long life.

TANKHIDE primers and finishing coats have been used satisfactorily for many years to protect millions of tons of iron and steel in structures, equipment and machinery in all sections of the country.

Besides TANKHIDE, Pittsburgh offers a complete line of high-quality protective coatings for every other need in the petroleum industry. These include production and refinery finishes for towers, pipe lines, buildings and equipment; service and bulk station paints; pump enamels and drum finishes.

Call on us for advisory service. Our wide experience can often help you and save you both time and money.

Send for FREE Paint Manual!

● Here's a handy manual of paint information that contains complete descriptions of all Pittsburgh finishes for the petroleum industry. Also tells how to use them most advantageously. We'll be glad to send you a copy—FREE. Just mail this coupon.

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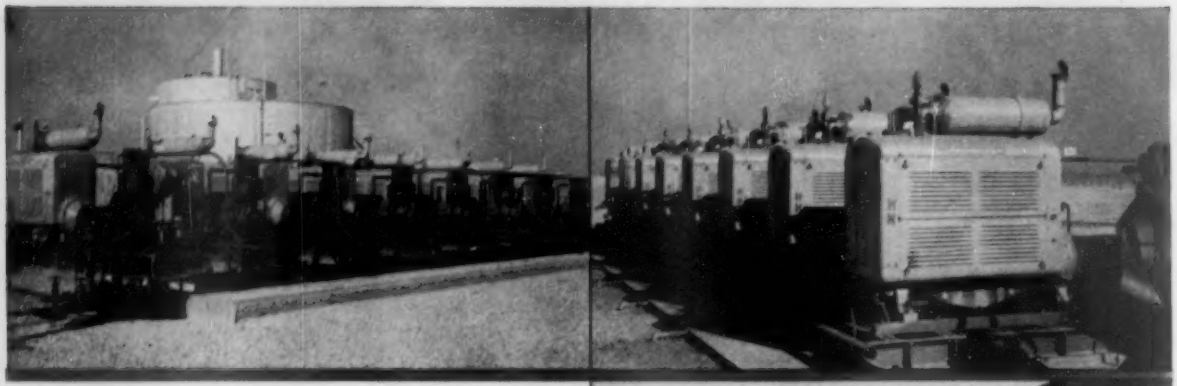
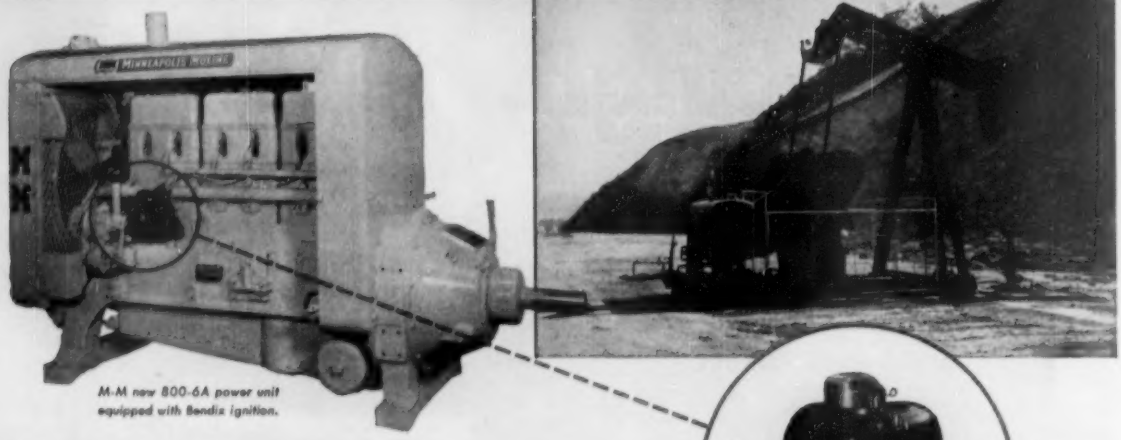
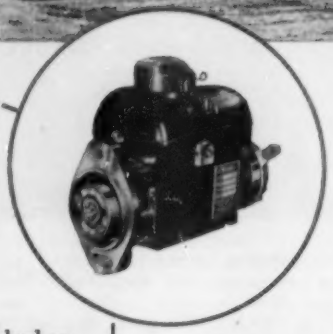




M-M new 800-6A power unit equipped with Bendix ignition.



with Minneapolis-Moline power units and Bendix ignition

Oil is the lifeblood of American industry. Minneapolis-Moline power units equipped with Bendix magnetos are helping materially to maintain a constant supply of this vital commodity. These versatile power units perform a great variety of services at many stages of petroleum production and processing.

The Bendix magneto selected by Minneapolis-Moline for this rugged service is a heavy-duty magneto with high electrical output for medium and large size engines of one, two, four and six cylinders. The magneto is supplied with fixed or variable spark and standard or low fire hazard ventilation. An impulse coupling provides for complete adjustment of lag angle and lug position.

Like all Bendix magnetos, the CBR series gives trouble-free performance for extremely long periods of time. Design simplification eliminates costly service maintenance.

Remember, Scintilla Division of Bendix manufactures a complete line of ignition for every industrial purpose. Our sales department will gladly furnish complete information.

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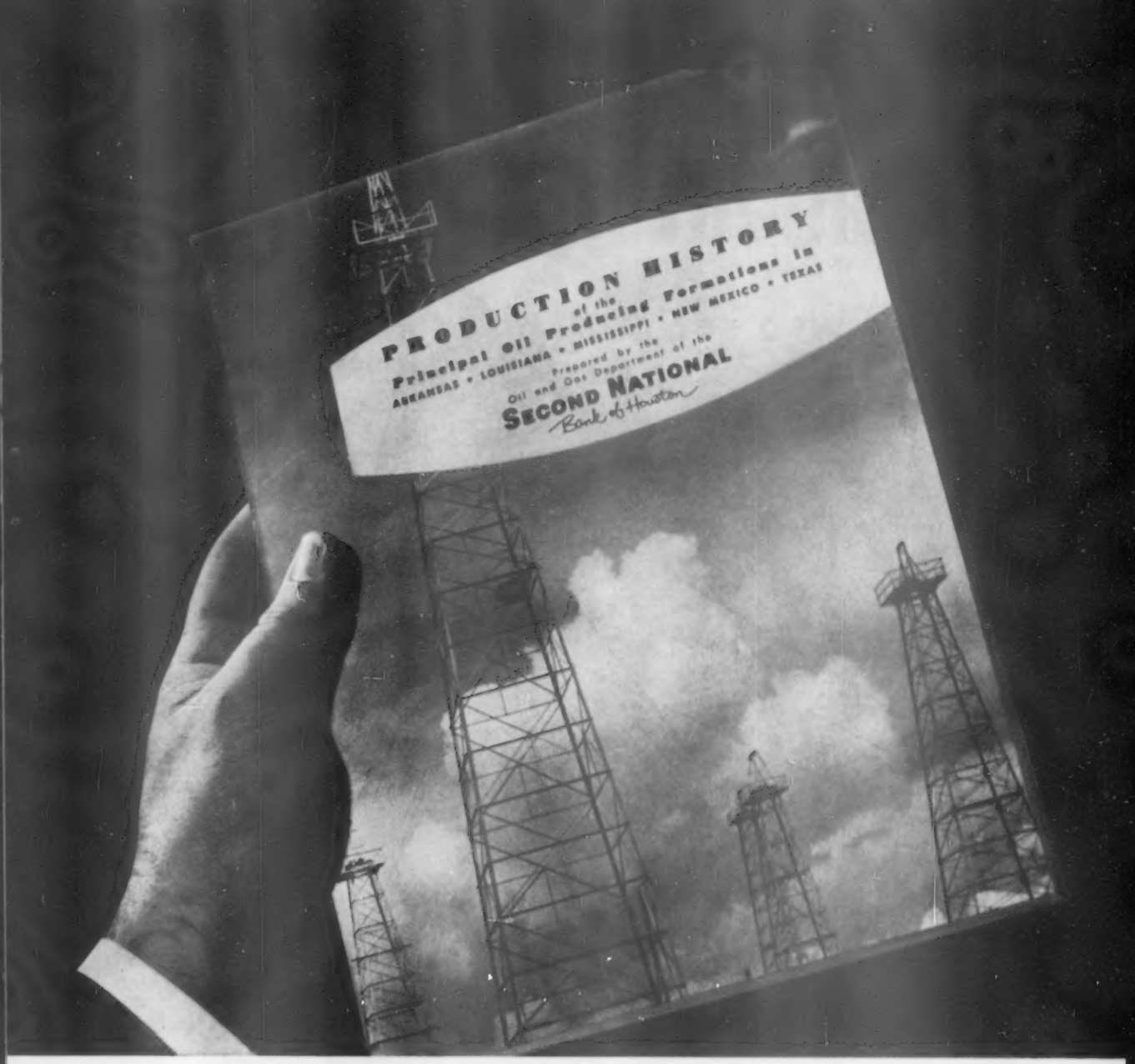
Bendix


PRODUCTION HISTORY
Principal Oil Producing Formations in
of the
ARKANSAS • LOUISIANA • MISSISSIPPI • NEW MEXICO • TEXAS
Prepared by the
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New PRODUCTION HISTORY - *yours for the asking*

"Production History of the Principal Oil Producing Formations in Arkansas, Louisiana, Mississippi, New Mexico, and Texas" — the new book, prepared by Second National's Oil and Gas Department — will be of great value to anyone interested in petroleum production.

BASIC DATA THROUGH 1952

Information from the A.I.M.E. publication, "Statistics of Oil and Gas Development and Production Through 1952," plus additional facts from the Texas Railroad Commission have been combined and rearranged in this publication.

18 FORMATIONS STUDIED

Production history is given for 18 principal oil producing formations. Statistics include: the name of the field; county; year of discovery; area of proved acres; production to the end of 1952; wells producing in December, 1952; gravity API; character of formation; percent of porosity; average net production thickness in feet. Using the foregoing data, recovery in barrels per acre and barrels per acre foot were calculated for each field.

This new compilation is presented with the hope that The Second National Bank can, in this way, contribute to the future success and prosperity of individuals in the petroleum industry.

GET YOUR FREE COPY NOW

For your free copy of "Production History" phone Second National's Oil and Gas Department, FAirfax 1371. Or just fill in the coupon below. There's no obligation, of course.

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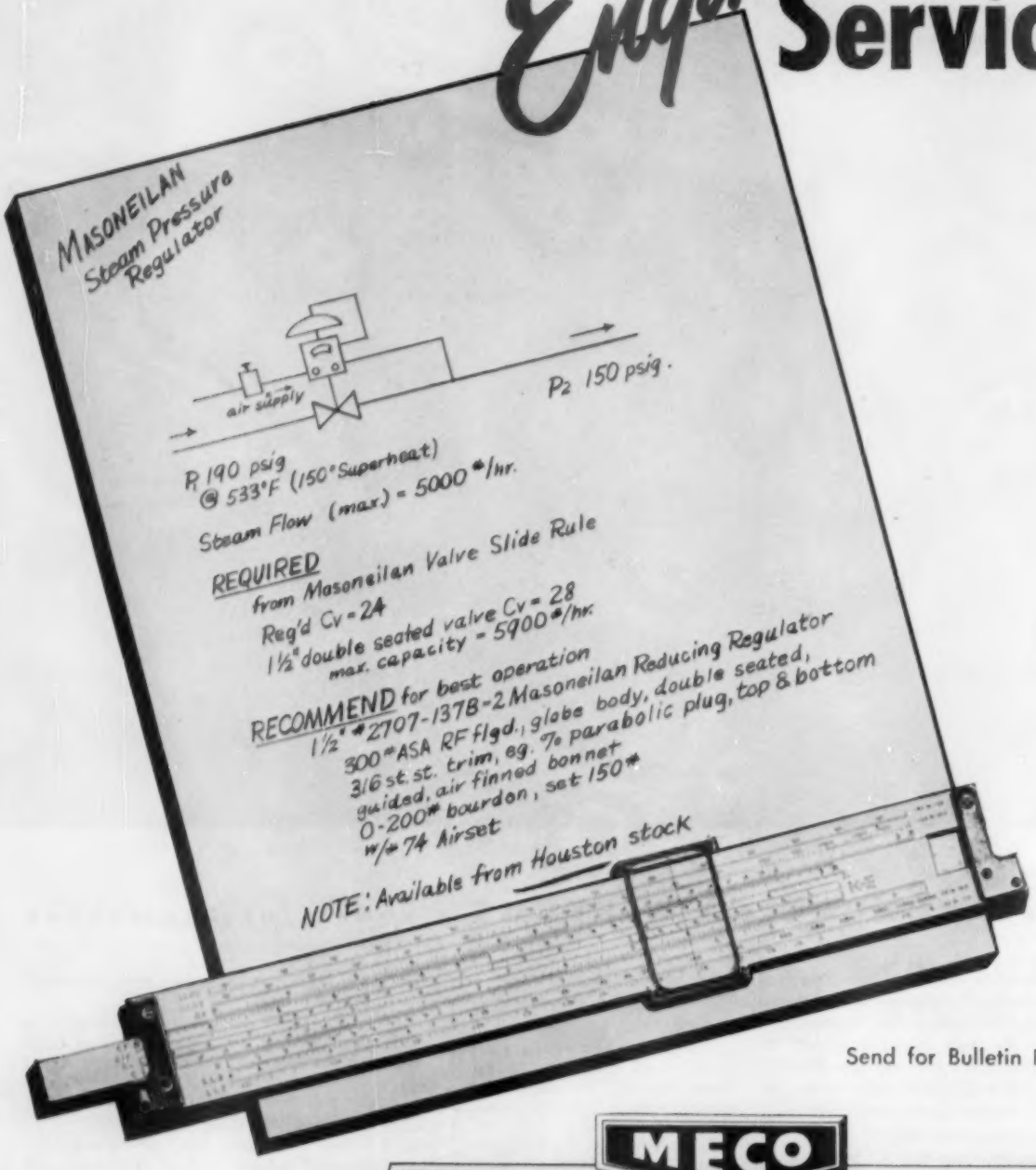
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RECOMMEND for best operation
1½" # 2707-137B-2 Masoneilan Reducing Regulator
300# ASA RF flgd., globe body, double seated,
3/16 st. st. trim, eg. 7% parabolic plug, top & bottom
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INTERNATIONAL 60,000 GVW 6-WHEELER

With New 212 hp. Royal Red Diamond Engine

There's a new model in the INTERNATIONAL line of 6-wheelers — a model with the power to haul capacity loads over the roughest terrain — a model built to absorb severe loading shocks, and with ability to move heavy loads long distances over-the-road at maximum safe speeds.

The new RF-230 is powered by the new INTERNATIONAL 212 hp. Royal Red Diamond 501 engine delivering 444 lb-ft torque at 1600 rpm. It has hydraulic full-power steering, 12-volt electrical system, other features. Engine and all components are precisely coordinated to assure maximum operating economy, minimum maintenance and long life.

This newest INTERNATIONAL is Tough-Job engineered like all INTERNATIONALS — has a surpassing measure of the performance, strength and stamina qualities that have made INTERNATIONAL the 6-wheel sales leader for 19 straight years. It is built to do big jobs, save big money. Get full facts from your INTERNATIONAL Dealer or Branch.

QUICK FACTS...

GVW rating, 60,000 lbs.

Wheelbase, 175 inches; optional wheelbases available.

Engine, INTERNATIONAL Royal Red Diamond 501, 4½-inch bore, 5¼-inch stroke, 501 cu. in. displacement. Max. hp., 212 at 3000 rpm. Max. torque, 444 lb-ft at 1600 rpm.

Frame, double, heat-treated alloy steel. Two 15,000 lb. capacity front tow hooks, standard.

Clutch, 15-inch single plate with vibration damper.

Transmission, direct-in-fifth main plus overdrive auxiliary.

Standard equipment includes hydraulic full-power steering, air brakes, 12-volt electrical system.

Optional equipment includes LPG fuel system, Comfo-Vision Space Saver cab for maximum front axle loading; high altitude engine equipment; tinted safety glass all around.

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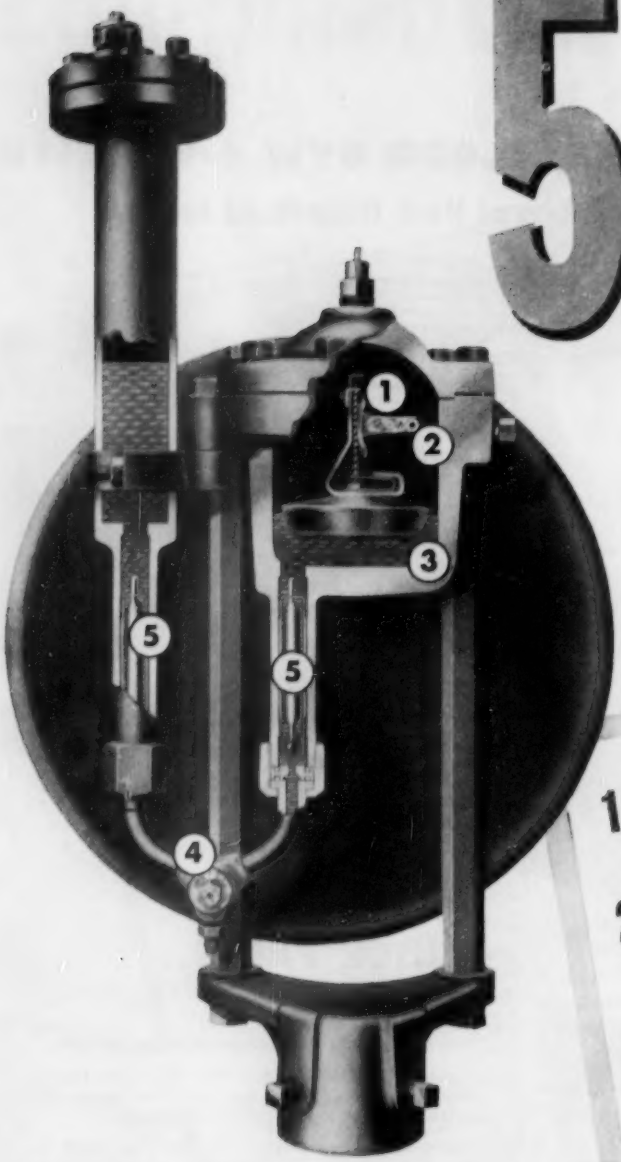
INTERNATIONAL® TRUCKS

"Standard of the Highway"

5 basic advances that mean BETTER FLOW METERING!



1 **New Segmental Drive Assembly** — stainless steel ball-type chain insures perfect alignment and friction-free travel of float.

2 **New Pressure-Seal Bearing** — stainless steel with exclusive seal ring . . . gives unmatched freedom at any working pressure from friction, maintenance and leaks. No lubrication required.

3 **New Compact Float Chamber** — greater accessibility for easier, quicker cleaning.

4 **New U-Bend and Damping Plug Assembly** — self-aligning, positive sealing, easily removable. Calibrated damping plug fully adjustable under pressure. Directed drain for mercury at lowest point.

5 **New Check Floats** — with positive-seating stainless steel ball plug. Submerged in mercury for complete protection against dirt and corrosion.

With major improvements in every basic detail, the complete new line of Foxboro Flow Meters now gives metering performance that's farther ahead of the field than ever before!

In addition to the outstanding advances illustrated, these new meters incorporate many other superior features, including: interchangeable parts; large floats with long travel for added power; and float in high pressure chamber to minimize ambient temperature effects.

Write for new Bulletin 460. It describes the complete new line . . . indicators, recorders, controllers, transmitters . . . with round or rectangular cases . . . with and without integrators. **The Foxboro Company, 6012 Neponset Ave., Foxboro, Mass., U.S.A.**

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You get *more* than gas-treating chemicals when you specify CARBIDE . . .

You get these extra benefits...

- the results of CARBIDE's 20 years' experience in the manufacture of amines and glycols.
- the service of CARBIDE's field representatives.
- the assistance of CARBIDE's laboratories where specialists devote a great amount of time to work on customer service problems.
- the benefit of CARBIDE's knowledge about the handling, properties, and use of these chemicals.
- the assurance of availability and fast service through CARBIDE's national distribution network of 50 warehouses. (In Canada: Harrisons & Crosfield's.) Shipments are made in tank cars, tank wagons, and drums in carload or truckload lots.

Remember

You get *more* than chemicals when you specify CARBIDE.

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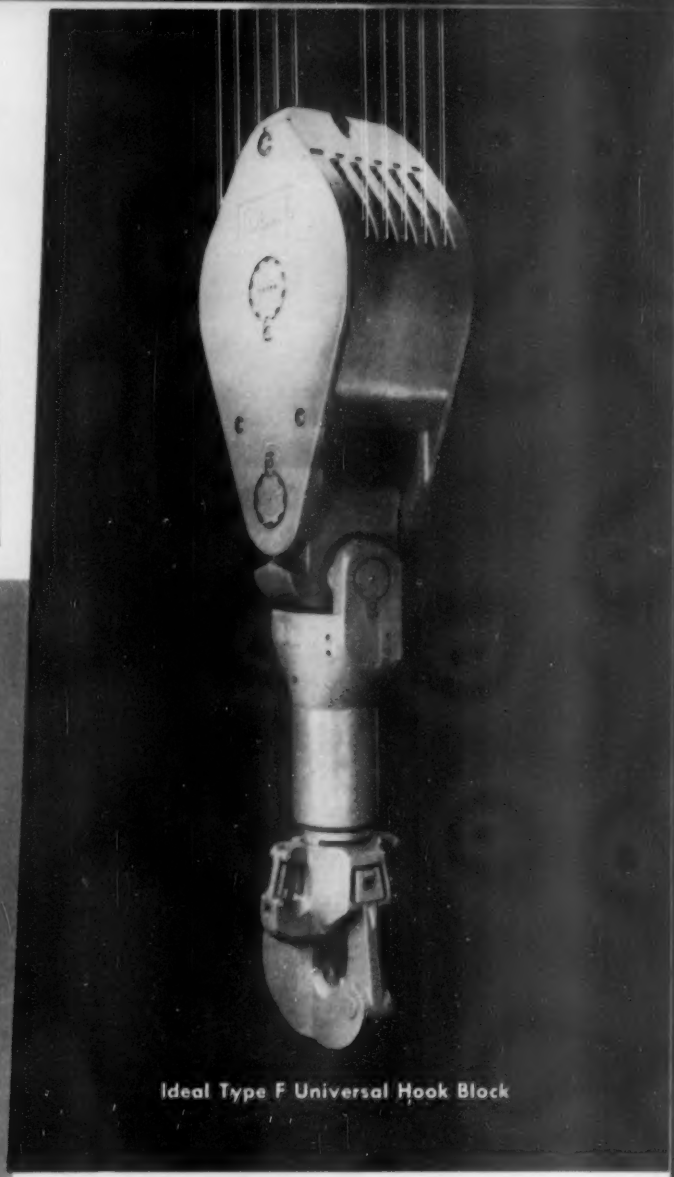
IDEAL TYPE F UNIVERSAL BLOCKS— FOR 300 TO 450 TON LOADS

The new swivel block "universal" pin joint feature in this heavy-duty, 300 ton-rated block distinguishes it from rigidly connected hook and block combinations.

Specifications

	Rating, Tons	No. Sheaves	Dia. Sheaves	Wire Line Size
Hook Blocks				
548-F-300	300	5	48"	1¼", 1⅜"
654-F-450	450	6	54"	1⅜", 1½"
Traveling Blocks				
548-F-300	300	5	48"	1¼", 1⅜"
654-F-450	450	6	54"	1⅜", 1½"



Ideal Type F Universal Hook Block

Ideal Type E Hook Block

IDEAL TYPE E BLOCKS— FOR 90 TO 200 TON LOADS

Designed to effect the greatest possible saving in vertical derrick space, this 200-ton rated block is typical of the "Type E" line.

Specifications

	Rating, Tons	No. Sheaves	Dia. Sheaves	Wire Line Size
Hook Blocks				
330-E-90	90	3	30"	1", 1⅛"
436-E-140	140	4	36"	1⅛", 1¼"
542-E-200	200	5	42"	1⅛", 1¼"
Traveling Blocks				
330-E-90	90	3	30"	1", 1⅛"
436-E-140	140	4	36"	1⅛", 1¼"
542-E-200	200	5	42"	1⅛", 1¼"

You get fast, true running action with these safety-engineered blocks!

Slow or unsafe derrick equipment can seriously hamper a drilling program. If you're losing time and money because of it, Ideal Hook or Traveling Blocks can solve your problems.

Just check the clean, simple lines of the two hook blocks at left. Each has been engineered for safety, built for rugged service and thoroughly field-tested. Typical of its line designed for light to medium loads, the 200-ton rated Type E Hook Block is constructed to save vertical derrick space, increase head room and permit full speed hoisting on smaller rigs.

The 300-ton rated Type F Universal Hook Block provides a unitized assembly at minimum overall length for space economy and greater flexibility. Along with a similar Type F Block rated at 450 tons, this fast-falling, stable hook block gives you the extra load capacity needed for deep drilling operations.

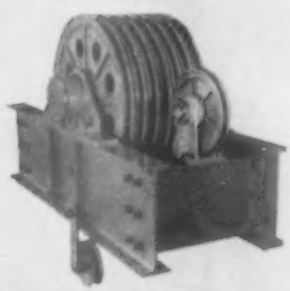
In both the Type E and F lines of Ideal Hook Blocks, you'll find these special hook features:

- Hook body mounted on tapered roller bearings
- Elevator link supports equipped with positive retaining links
- Automatic-latching hook tongue cannot be accidentally opened
- Spring-actuated 8-position rotation lock
- Grooved hook body facilitates elevator alignment with drill pipe

National offers a complete line of Ideal Type E and F Hook Blocks and Type E and F Traveling Blocks which have these additional and important design features:

- Sheaves independently mounted on tapered roller bearings
- Individual lubrication to each sheave bearing
- All parts securely locked for safety
- Streamlined — all nuts, bolts, pins and fittings recessed
- Shot peened alloy steel shank springs
- Short, low stressed pins and shafts

All of these features add up to one important fact, proven by oil men everywhere: you can count on safe, dependable performance from an Ideal Block. Why not get more information now on the Ideal Block to meet your specific needs? Just ask your National Supply representative or stop at the National Store nearest you.



THE NEW IDEAL TYPE F CROWN BLOCK, rated at 525 tons, is a sturdy companion unit to the largest Type F Hook Block or Traveling Block. It has these features which eliminate line fouling and assure smooth running and long life:

- Narrow overall design, with greater proportionate strength-to-weight ratio
- Flame-hardened sheave grooves, with wide flare
- Sheaves independently mounted on tapered roller bearings
- Individual lubrication to each sheave bearing

THE NATIONAL SUPPLY COMPANY — NSCO — NATIONAL BLUE PRODUCTS

THE NATIONAL SUPPLY COMPANY

PITTSBURGH 30, PENNSYLVANIA

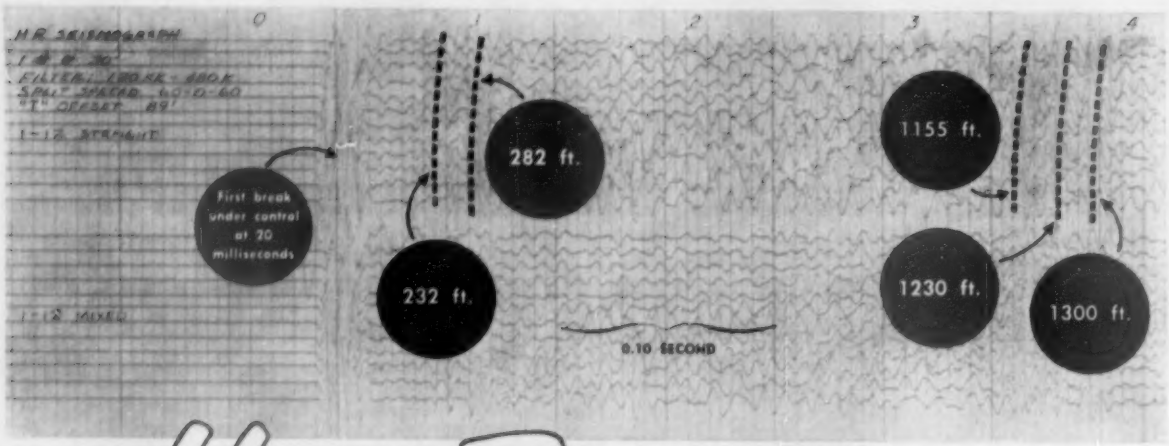
DIVISION OFFICES: Denver; Ft. Worth; Houston; Pittsburgh; Tulsa; Torrance

CANADA: The National Supply Company, Ltd., 200 F. W. Clark Building, 709 Eighth Avenue, West, Calgary, Alberta

EXPORT: 600 Fifth Avenue, New York 20, N. Y., U. S. A.; River Plate House, 12 South Place, London E. C. 2

NATIONAL OIL FIELD MACHINERY AND EQUIPMENT

SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES



High Resolution

here's a new record for near-surface seismic data

If you're plagued with the problem of obtaining accurate near-surface seismic data, look carefully at the record illustrated here. With first breaks under control in 20 milliseconds, a reliable reflection was obtained at a depth of 232 feet. This record is typical of the results obtained by the new Houston Technical Laboratories High Resolution Seismic System. A major development in geophysical prospecting, the HTL portable HR System now makes possible reliable reflection surveys over a depth range of 100-2500 feet. It is especially designed for use in petroleum exploration, mining, ground water location, and civil engineering where shallow seismic information is vital.

WRITE for Technical Bulletin No. S-303 for additional information about how you can now make reliable *shallow reflection* surveys.

use the HTL portable HR seismic system to:

- establish near-surface velocity control
- obtain near-surface structural data
- supplement core-hole information

HTL

HOUSTON TECHNICAL LABORATORIES

A SUBSIDIARY OF TEXAS INSTRUMENTS INCORPORATED

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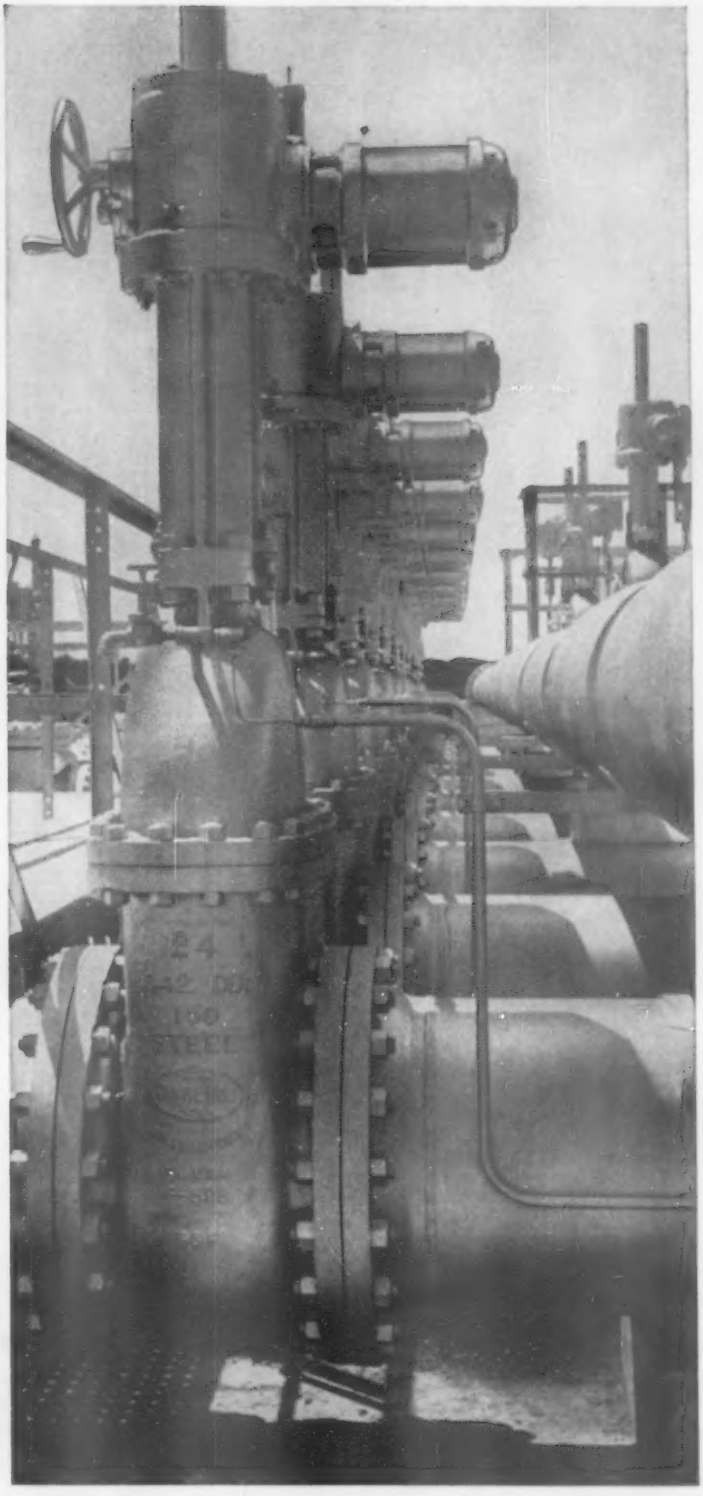


DARLING VALVES

How to line up a *cost-important* principle

THESE Darling gate valves have one thing in particular no other gate valves can match—Darling's *fully revolving double disc, parallel seat principle.*

What does this mean?

Skipping to end results . . . smoother, easier valve operation . . . automatic compensation for valve body distortion to assure tight closure . . . and avoidance of wear concentration areas on both discs. In turn all this just naturally adds up to longer valve life, surer performance, less maintenance, less part replacement, less down time, and lower over-all operating cost.

These gains are a matter of record—the real reason why Darling valves today are picked for so many oil and gas line jobs. Give us an idea of your service needs and get complete, specific details on the Darling valves that can do the *best* kind of a job for you!

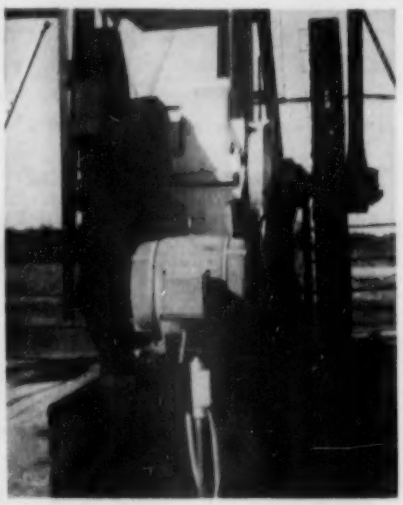
Line-up of Darling 24" motor-operated steel gate valves at a major crude oil pumping station. Here, as elsewhere, Darling's fully revolving double disc feature pays off.

DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pa.

Manufactured in Canada by Sandilands Valve Manufacturing Co., Ltd., Galt 19, Ontario

Wagner 15 hp splash-proof motor on a Magnolia Petroleum Company unit pumper in Lea County, New Mexico.



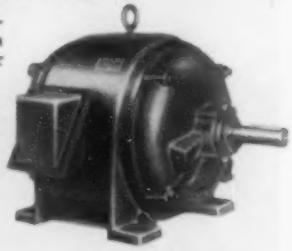
This Wagner 15 hp Type XP high torque splash-proof motor operates a unit pumper in Magnolia's Mankins No. 1 field, Shamrock, Texas.

Wagner MOTORS
your best choice
FOR OIL WELL PUMPING

Wagner Motors for oil well pumping are the standard choice of many leaders in the petroleum industry because these motors are especially engineered to do the job expected of them. They will operate continually—without attention—while exposed to all kinds of weather.

The line includes 40° C drip-proof motors that combine the desirable characteristics of open motors with protection that assures long outdoor life; splash-proof motors that offer additional protection if desired; and high power factor type capacitor motors, with the same enclosures, for use where single-phase motors are needed.

Wagner also furnishes totally-enclosed fan-cooled motors in standard or explosion proof types for use in pumping stations or refineries.



Bulletin MU-137 on Oil Well Pumping Motors and Bulletin MU-132 on Cast Iron Frame Motors give complete information. Thirty-two branch offices are ready to assist you in any motor application problem.

Wagner Electric Corporation
EST. 1891

WAGNER ELECTRIC CORPORATION
6389 PLYMOUTH AVE., ST. LOUIS 14, MO., U.S.A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

ELECTRIC MOTORS
TRANSFORMERS
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BRAKE SYSTEMS—
AIR AND HYDRAULIC

M56-19

LUFKIN

2 CYLINDER—2 CYCLE HORIZONTAL GAS ENGINES . . .

2 ENGINES IN 1

Two CYLINDERS

- FOR SMOOTHER OPERATION
  Two power strokes per revolution reduces shock and vibration.
- FOR LOWER STARTING TORQUE
  Requires less power for starting.
- FOR GREATER OPERATING SPEED RANGE.

COMBINES THE ADVANTAGES OF SLOW SPEED FOR RUGGEDNESS AND LONG LIFE WITH THE SMOOTHER POWER DELIVERY OF EXTRA CYLINDERS.

Only LUFKIN

MANUFACTURES OILFIELD ENGINES IN THE SOUTHWEST AREA. CONSEQUENTLY OUR CUSTOMERS ARE ASSURED OF RAPID SERVICE AND OVERNIGHT SUPPLY OF PARTS.

Lufkin **FOUNDRY & MACHINE COMPANY**

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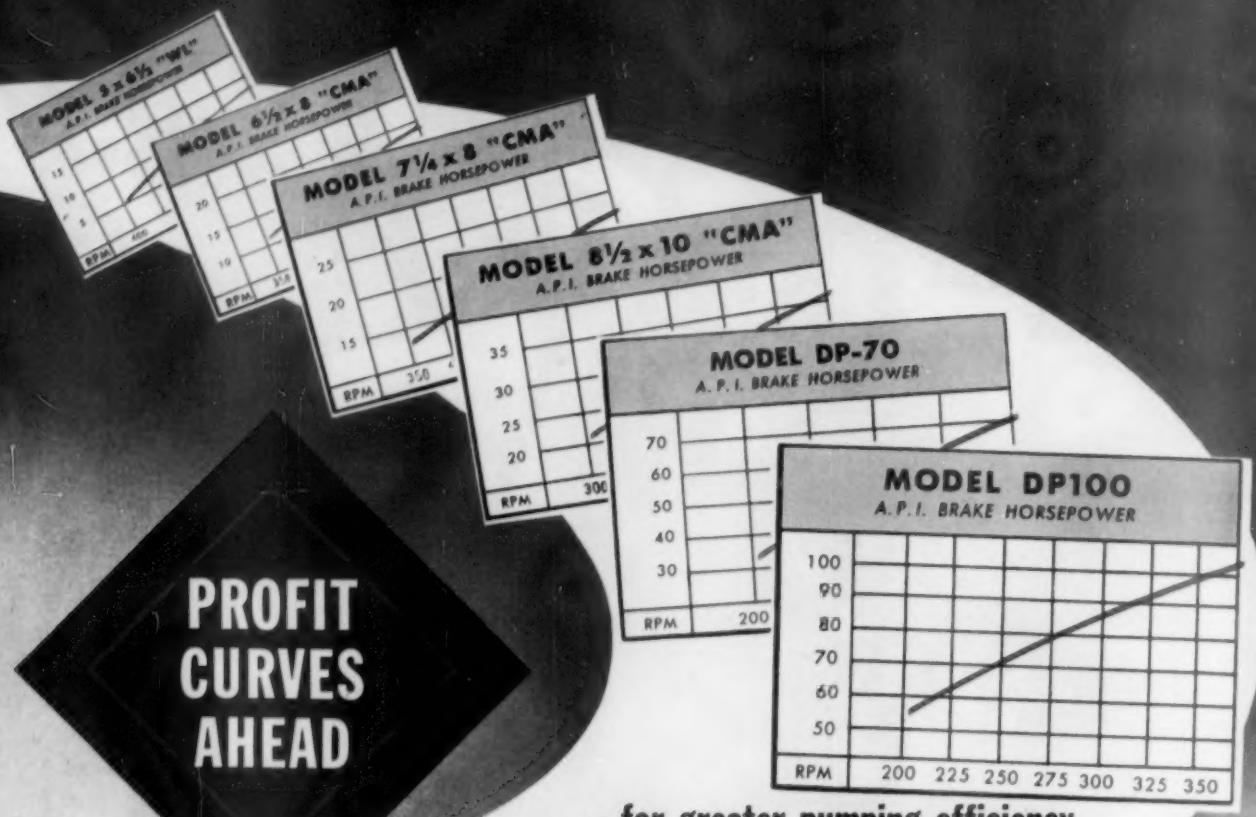
Lufkin equipment in Canada is handled by THE LUFKIN MACHINE CO., LTD., 14321 108th Avenue, EDMONTON, ALBERTA, CANADA



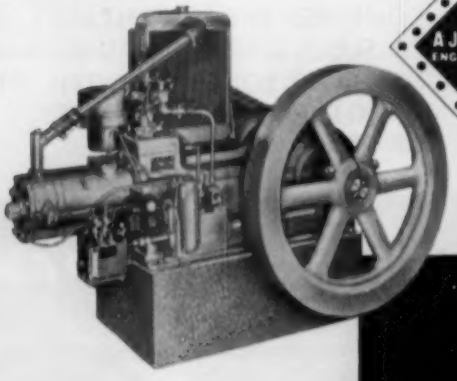
PROFIT CURVES AHEAD

—for greater pumping efficiency at lower pumping costs!

Ajax

GAS AND OIL ENGINES

The horsepower curve of each engine in the complete AJAX line tells its own action story to the experienced oil man! Engine for engine, size for size, it's AJAX for top power and economy. Your Supply Man will be glad to produce "the curves that make money for you." Ask him!



The complete line —

5 to 105

A. P. I. HORSEPOWER

AJAX IRON WORKS

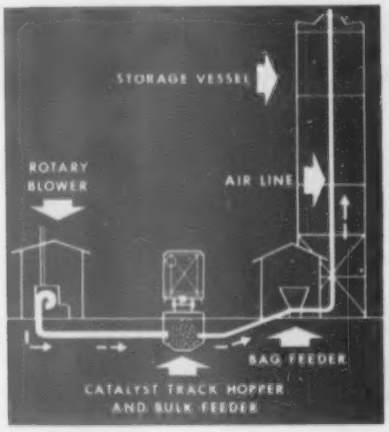
Builders of GAS AND OIL ENGINES, PRESSURE PUMPS, STEAM DRILLING ENGINES, INDUSTRIAL STEAM ENGINES

CORRY, PENNSYLVANIA

Oil Field Distributors: THE NATIONAL SUPPLY CO., PITTSBURGH, PA. · R. B. MOORE SUPPLY CO., BOLIVAR, N.Y. · BETHLEHEM SUPPLY CO., TULSA, OKLAHOMA

Capsule Case History:

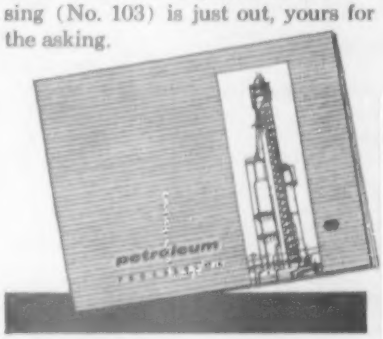
...before you leap



During Design Of A Refinery Expansion which included a Houdriflow moving-bed cat-cracker, Kaiser Engineers departed from the ordinary method of handling bulk catalyst. Result—a unique all-weather continuous system moving 7½ tons of catalyst per hour by high-velocity air stream.

Discontent With Normal Practice produced a more efficient operation with a maximum attrition guaranteed at not more than 2%. Another case where a fresh approach paid off. This look-ahead service by the KE team is available to your firm for the design and construction of your next petroleum or petrochemical project.

A new brochure on petroleum processing (No. 103) is just out, yours for the asking.



A careful look by Kaiser Engineers often results in departure from traditional methods in developing plant designs that anticipate the client's needs for future expansion and improvements. Numerous examples of this type of cost-saving engineering foresight are to be found in work performed by Kaiser Engineers in the broad fields of industrial design and construction.

kaiser | engineers ...for low operating costs

DIVISION OF | HENRY J. KAISER COMPANY

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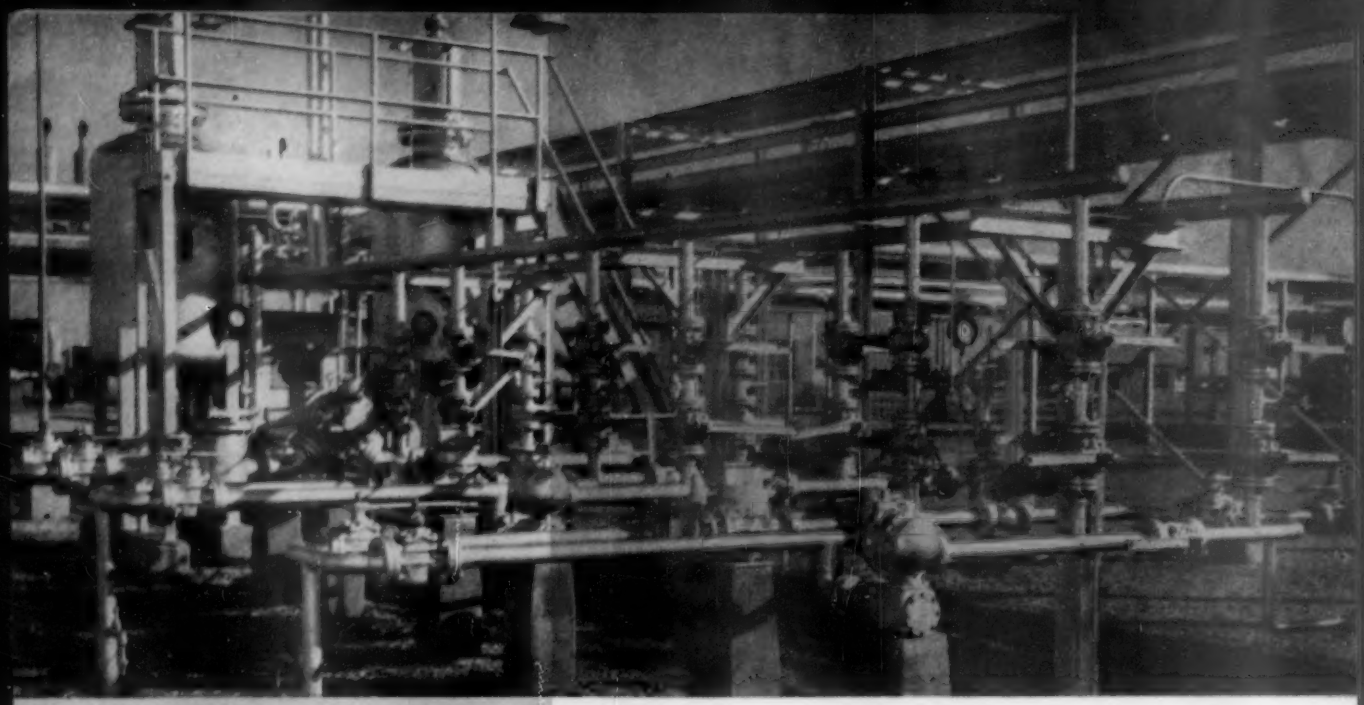
• HENRY J. KAISER CONSTRUCTION CO. • HENRY J. KAISER COMPANY (Canada) LTD., MONTREAL



Examine the list of analyses. Then, before you choose your new piping or tubing, get in touch with our engineers. In that way, you'll be certain to get the right analysis for your particular requirements. Our recommendations are a service to you, putting you under no obligation.

National Tube's 25 different steel tube analyses:

Carbon	5 Cr, ½ Mo	18-8
Carbon, ½ Mo	5 Cr, ½ Mo, 1½ Si	18-8 Ti
½ Cr, ½ Mo	7 Cr, ½ Mo	18-8 Cb
1 Cr, ½ Mo	9 Cr, ½ Mo	18-8 Mo
1¼ Cr, ½ Mo	9 Cr, 1 Mo	25-20
2 Cr, ½ Mo	9 Cr, 1 Mo	3½ Ni
2¼ Cr, 1 Mo	12 Cr	5 Ni
2½ Cr, ½ Mo, ¾ Si	12 Cr, Al	
3 Cr, 1 Mo	17 Cr	

Refinery Tubing Problems?

We specialize in solving them

● Before you select refinery pipe and tubes, perhaps we can help you in the many problems you must face: basic differences in equipment, variations in fabricating operations, service pressure, high or low temperature conditions, presence of corrosive media, etc. Individually or collectively, all of these factors enter into determination of the best pipe or tube material for your particular service conditions.

You aren't expected to be a tubing expert—it isn't part of your job. It's ours. Our *specialty* is tubing. Through research and laboratory experimentation, through on-the-scene observations, and by studying actual installations, we at National Tube have built up an "experience file"—a collection of case histories that date back through 60 years of solving tubing problems. We want to share this experience with you.

To meet the increasingly more rigorous demands of refinery service, National Pipe and Tubes have been constantly improved until now we are able to offer you seamless tubing, condenser and heat exchanger tubes, and refinery piping in a wide range of analyses—25 of which are listed at the left. Each of these 25 analyses meets the specific requirements of corrosion and oxidation for which it is recommended. Other chemical compositions are also available in tubular products, and a wide variety of high temperature problems are now under study.

NATIONAL TUBE DIVISION,
UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
(Tubing Specialties)
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

WALLS WITHOUT WELDS

USS NATIONAL SEAMLESS PIPE AND TUBES

USS

UNITED STATES STEEL

PETROLEUM CHEMICALS DIVISION
NEWS

December ★ One of a Series of Interest to the Petroleum Industry ★ 1954

Unique Spectrometer Traces Little Known Reactions Leading to Knock

At the Du Pont Petroleum Laboratory, new light is being focused on happenings in the combustion chamber.

Research scientists using a new spectrometer are now able to study, as never before, what goes on in the combustion chamber just before knock.

The apparatus, which was developed for the Petroleum Laboratory, is built around a single-cylinder engine. Light is passed through windows in opposite sides of the combustion chamber—in one window and out the opposite. The engine is operated in such a way as to cause the reactions leading to knock to take place throughout the entire combustion chamber rather than, as is normally the case, in only a small portion of the chamber.

Electrical Impulses

As the light passes through the mixture in the engine some of its energy is absorbed by the chemicals present in the combustion chamber. The light leaving the engine is converted into electrical impulses for automatic recording on a strip chart. Combustion chamber windows of quartz, rock salt and lithium fluoride make it possible to cover the ultraviolet visible and infrared regions.

Because each chemical reaction in the chamber varies the amount of light that gets through at different wave lengths, the spectrometer can make a record—automatically—of changes taking place within the chamber.

First of its kind

This is the first spectrometer of its kind. And it is being used exclusively to determine what causes knock and how tetraethyl lead and other materials react in the fuel to prevent it. From equipment such as this, it is hoped, new ways of suppressing knock will be discovered. Already the spectrometer is beginning to yield valuable information on hydrocarbon radicals formed under pressure in the combustion chamber—and their role in knock.

When final results of these tests have been analyzed, findings will be published and made available to the petroleum and automotive industries.

Two New Type Lube Oil Additives Developed by Du Pont

New polymeric additives offer low-cost solution to sludge problems resulting from low-duty engine operation

Since sludge deposits caused by stop-and-go driving are a major problem in the average passenger car, two new Du Pont lube oil additives can give you a tremendous sales advantage in the motor oil market by overcoming this widespread trouble. They also offer outstanding advantages to operators of urban taxi, bus and truck fleets.

Sludge problems in the making! Stop-and-go city driving conditions like this are a major cause of engine sludge.

The two new additives are *Du Pont Lube Oil Additive 564* and *Du Pont Lube Oil Additive 565*. Both are polymeric additives with outstanding detergency and varying in shear stability and viscosity-index improving properties.

Double-action

These two-way detergent and V. I. improving addi-

OVER

ADVERTISEMENT—Prepared for the Petroleum Chemicals Division of E. I. du Pont de Nemours & Company (Inc.)

PETROLEUM CHEMICALS DIVISION
NEWS

CONTINUED *New Additives*

tives are economical and exceptionally effective in retarding sludge formations caused by low-power, low-temperature and other driving conditions. Thus, they help to maintain good engine lubrication and to extend the useful life of the engine.

Reduces sludge

These ashless polymeric lube oil additives maintain more efficient operation of the engine oil system. Oil screens, filters and oil lines are kept clean and sludge-free. And the resulting free flow of oil through the engine keeps it in better operating condition.

Cost less than other detergents

The new Du Pont polymeric lube oil additives are effective in low concentrations. This, combined with their two-way detergent–V. I. improver action, means lower cost manufacture of multi-graded oils of superior performance.

Test results

To test the effectiveness of *Du Pont Lube Oil Additive 564*, a fleet of taxicabs was run for 50,000 miles of low-duty service. Factory-new engines were installed in all cabs at the beginning of the test, with oil-drain periods established at 4500 to 5000 miles.

Some of the test cars were operated with a representative heavy-duty motor oil (For Services MS and DG). Others were operated with the same base oil to which *Du Pont Lube Oil Additive 564* and an antioxidant had been added.

The results of this test are shown clearly in the following photographs.

NOTICE THE DIFFERENCE in sludge on the oil screen and timing gear cover on the left as compared to the clean appearance of the corresponding parts at the right. Those on the left were operated on a representative heavy-duty motor oil (For Services MS and DG). The cleanliness of those on the right resulted from the use of the same base oil to which Du Pont Lube Oil Additive 564 and an antioxidant had been added.

Continued—bottom of next column

ASSISTANT EASTERN REGION MANAGER

WESLEY T. DORSHEIMER was recently named Assistant Manager, Eastern Region, by the Du Pont Petroleum Chemicals Division. Prior to this appointment he had served as an Account Manager of the Eastern Region.

He joined the Du Pont Company in 1952 as a sales-service representative in the Petroleum Chemicals Division. He started his career as an engineer in the Technical Service Division of the Esso Standard Oil Company at Bayway, New Jersey. He then became a sales engineer for C. F. Braun and Company in Alhambra, California. From 1948 until he joined Du Pont, he was assistant sales manager of the Chemical Industries Division of the Foxboro Company in Foxboro, Massachusetts.

Mr. Dorsheimer was graduated from Carnegie Institute of Technology with a B. S. degree in chemical engineering.

WESLEY T. DORSHEIMER

He is a member of the American Chemical Society and the American Institute of Chemical Engineers.

Du Pont Metal Deactivator Valuable Additive for Distillate Fuel Oils

When used in diesel and home heating oils, Du Pont Metal Deactivator (DMD) has *three* outstanding advantages.

1. It retards residue formation during storage. In the distribution of distillate fuels it is difficult to avoid copper contamination which accelerates oxidation reactions. This copper is rendered inactive by the addition of extremely small quantities of DMD.

2. It prevents color deterioration caused by copper catalyzed reactions.

3. It inhibits formation of copper mercaptide. Copper mercaptides formed by the reaction of mercaptans with copper or brass sometimes pose a serious problem in diesel and heating oils. They can plug filters or other parts and completely stop the flow of oil. An economical way of minimizing the harmful effects of this reaction is to deactivate the copper chemically with DMD.

Although DMD is highly effective when used alone in fuel oils, it is of maximum value when used in combination with an antioxidant and dispersant such as Du Pont Fuel Oil Additive No. 2.

Commercial quantities of both these new Du Pont additives are now available. For testing their effectiveness in your own oils, any of our regional offices listed below will be glad to arrange for free samples.

DU PONT
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. . . through Chemistry

Petroleum Chemicals

E. I. DU PONT DE NEMOURS & COMPANY (INC.)
Petroleum Chemicals Division • *Wilmington 98, Delaware*

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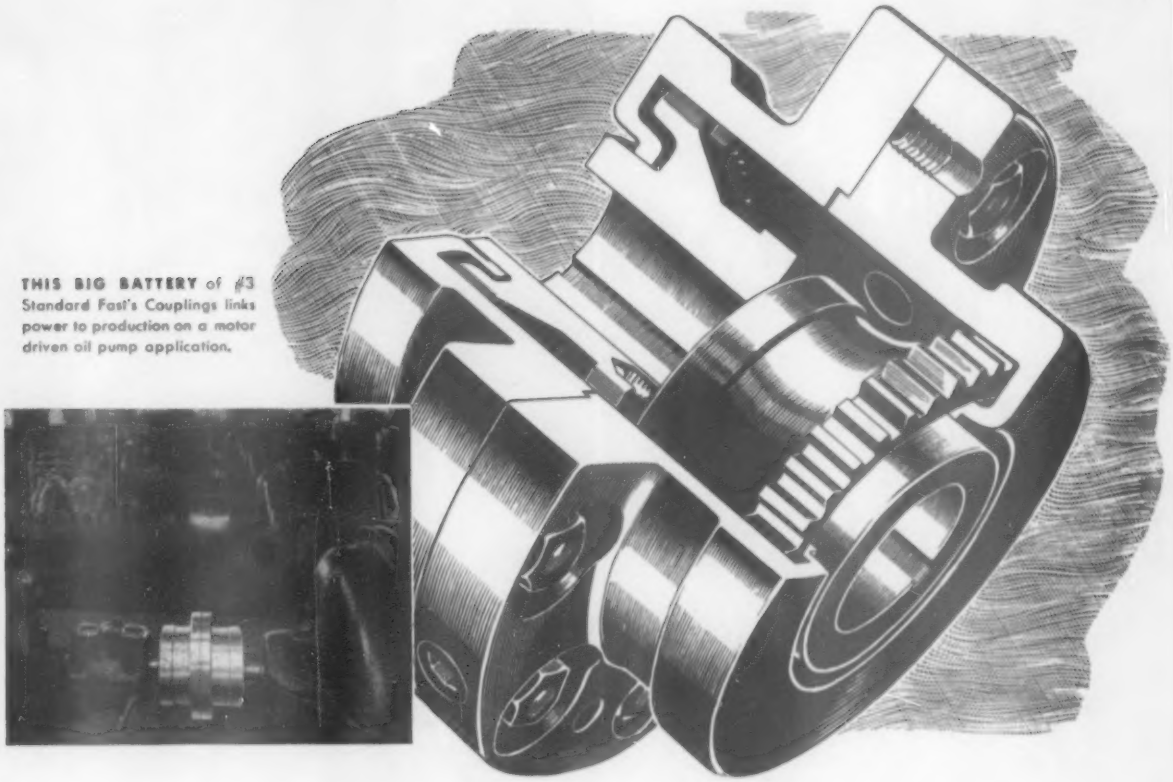


THIS BIG BATTERY of #3 Standard Fast's Couplings links power to production on a motor driven oil pump application.

For free engineering service that saves dollars and down-time . . .

FAST'S Couplings are FIRST!

When you specify Fast's Couplings, you get the benefit of Koppers *free engineering service* . . . your assurance of the right coupling for any job and the right solutions to tough coupling problems.

FOR EXAMPLE: "Get the drawings and send them down to Koppers" is the standard answer in one plant whenever a tough coupling application arises!

FOR EXAMPLE: After studying a list of spares for stand-by units made up by one customer, a Koppers sales engineer eliminated duplications . . . resulting in a smaller order for him but a *much smaller inventory* for the customer!

Add the *rugged construction* of Fast's Couplings . . . with their original design maintained without basic change or sacrifice in size or materials. Add their lowest cost per year . . . their life expectancy guarantee. *Fast's usually outlast the equipment they connect.* Result: it will pay you to write today for full details on how Fast's Couplings and Koppers Engineering Service can help you get uninterrupted power transmission! Send for free catalog to: KOPPERS COMPANY, INC., *Fast's Coupling Dept.*, 382 Scott Street, Baltimore 3, Md.

KOPPERS

THE ORIGINAL

FAST'S Couplings

METAL PRODUCTS DIVISION • KOPPERS COMPANY, INC. • BALTIMORE, MD. This Koppers Division also supplies industry with American Hammered Industrial Piston and Sealing Rings, Koppers-Elex Electrostatic Precipitators, Aeromaster Fans and Gas Apparatus.

Engineered Products Sold with Service

KOPPERS COMPANY, INC., *Fast's Coupling Dept.*, 382 Scott St., Baltimore 3, Md.

Gentlemen: Send me a Fast's Catalog giving detailed descriptions, engineering drawings, capacity tables and photographs.

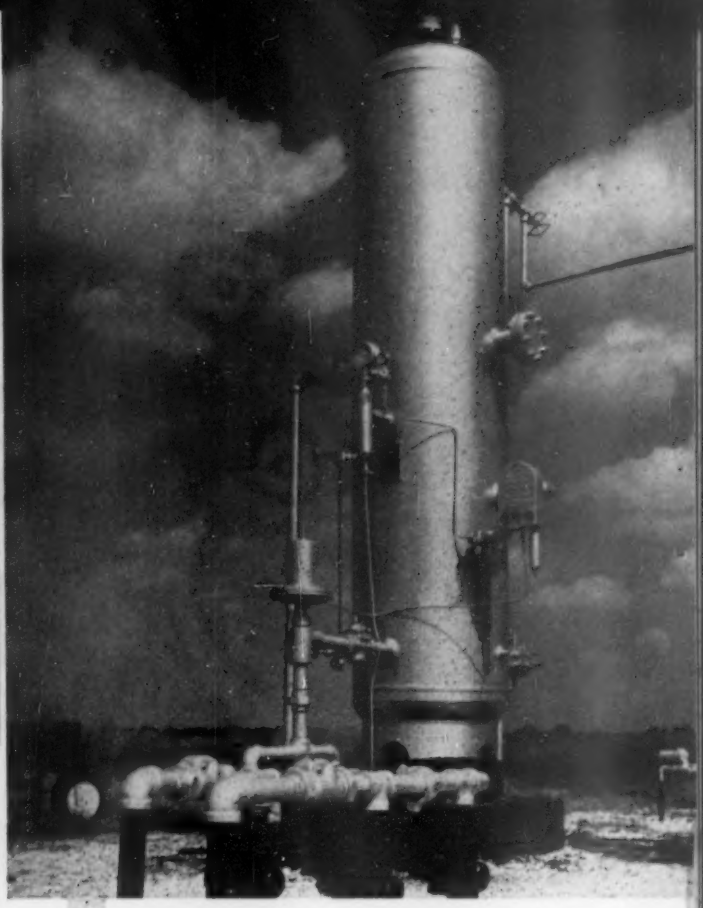
Name .....

Company .....

Address .....

City ..... Zone ..... State .....

Picture of Perfect Performance by PARKERSBURG

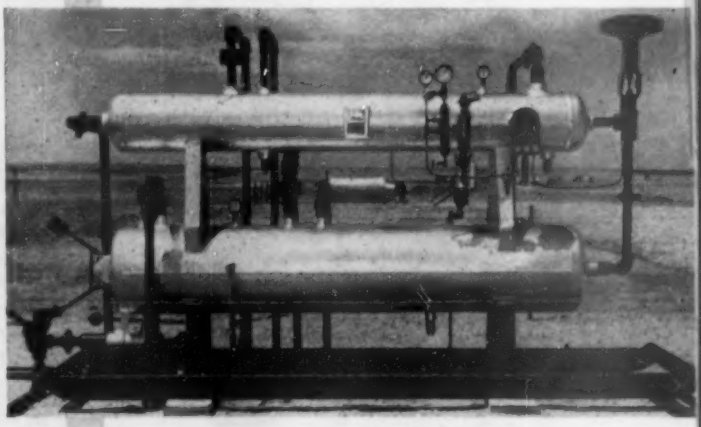


• Parkersburg 30" x 10' x 500 lb. Vertical Separator with our No-Bleed Liquid Level Control.

Parkersburg Separators—Vertical or Horizontal, give you perfect performance in all oil and gas separating conditions.

The unlimited range of types and sizes . . . the availability of special units means we can furnish exactly the separator required to meet any conditions with maximum efficiency.

Ask your Parkersburg Representative about the separator you need for perfect performance.



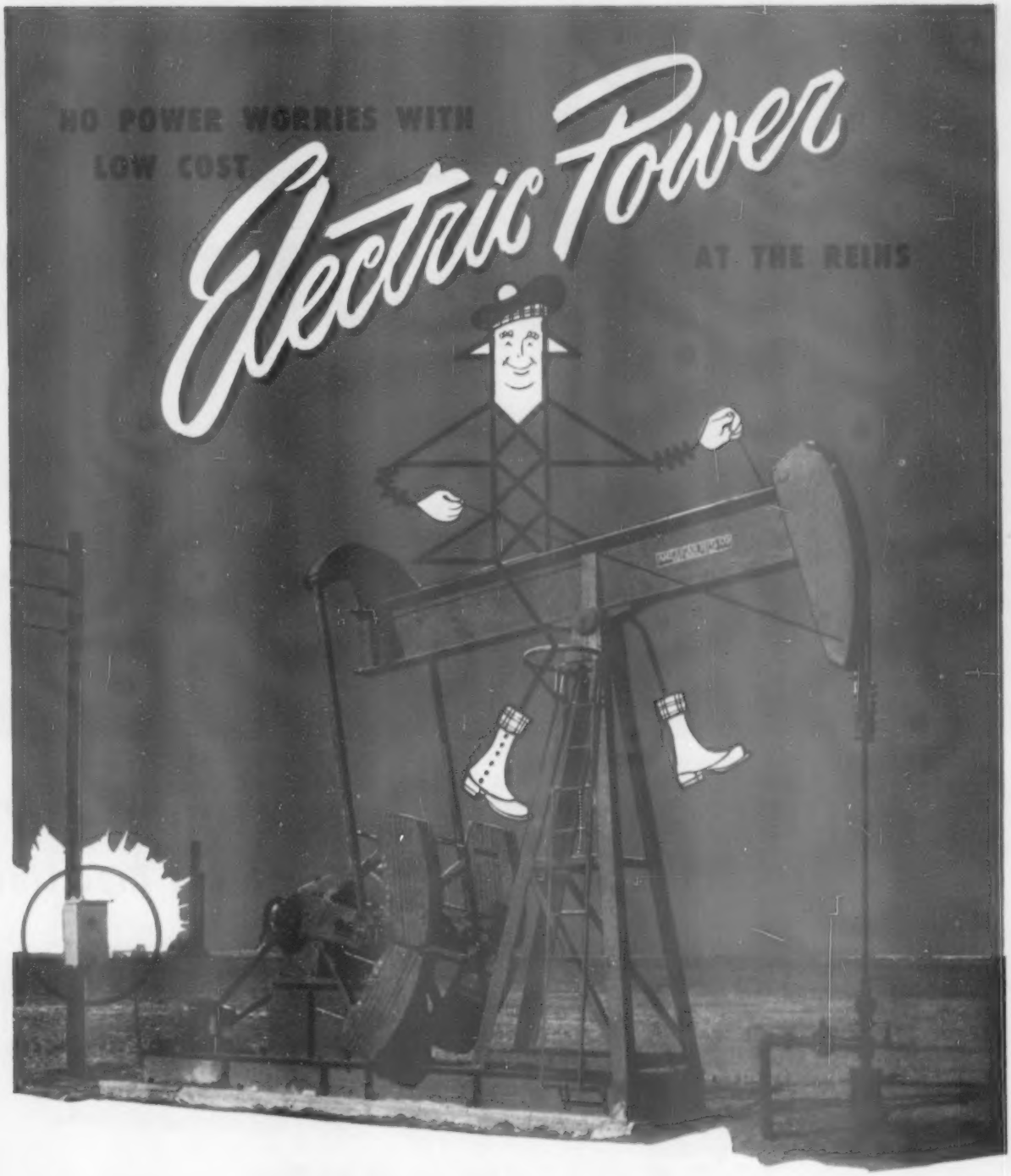
• Unitized assembly of Parkersburg Horizontal Separators. The upper vessel is 16" x 10' x 1000 p.s.i.; the lower is 24" x 10' x 125 p.s.i.

5427

THE PARKERSBURG RIG & REEL COMPANY • PARKERSBURG, WEST VIRGINIA

Division of Parkersburg-Aetna Corporation

HORIZONTAL AND VERTICAL SEPARATORS • HYRECO • KNOCKOUTS • SCRUBBERS • TREATERS • HEATERS



PETROLEUM ELECTRIC POWER ASSOCIATION

CALL YOUR NEAREST ELECTRIC SERVICE COMPANY FOR MORE FACTS OR ADDRESS YOUR REQUEST TO P. O. BOX 2771, DALLAS, TEXAS

With Low Cost Purchased Electric Power at the reins, oil field power worries end. This Electrically Powered pumping unit in West Texas, for example, gives the operator constant dependable service year around regardless of weather. And not only is LCP* dependable and clean, but it's *the most economical oil field power* obtainable. Hand over your power reins to LCP and end your own power worries. Contact your nearest Electric Power representative — *today!*

*Low Cost Power

Welders at work...ON THE "B-36"

...the Gas Industry's New Giant Pipe Line

• One of the many new problems posed by the "sewer-pipe" method of laying this 36″ line for Transcontinental Gas Pipe Line Corporation, was the accuracy required in spacing the bellholes.

They were staked at 40′ intervals by engineers working along with the ditching crews. This frequently required extensive grading.

Engineering played a vital part in the construction of this line.

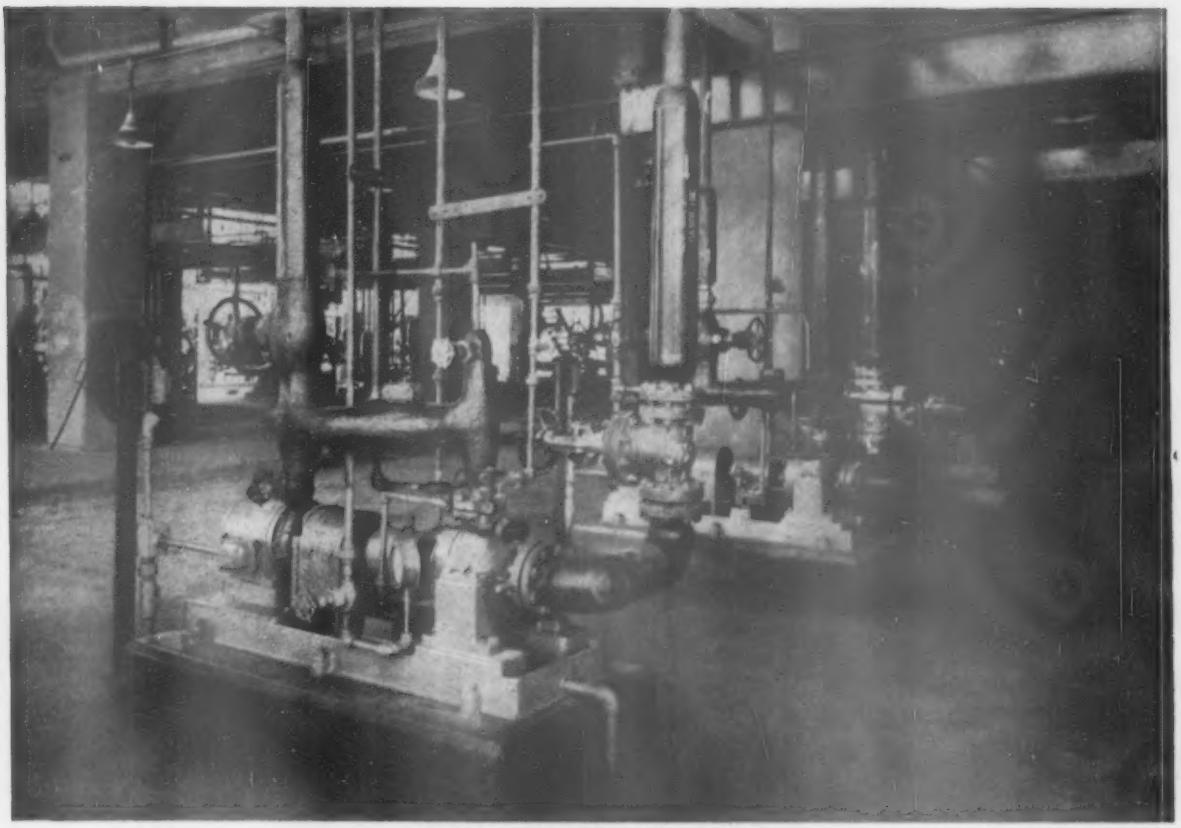
It pays to associate with . . .

ASSOCIATED
PIPE LINE CONTRACTORS, INC.

Earl Allen, President
J. W. Sharman, Vice President
Sam A. Taylor, Vice President
John Gay, General Manager

P. O. Box 13216 • HOUSTON 19, TEXAS • Linden 7561

Cable Address: APLICO, Houston • 2819 Minnesota Ave., Billings, Montana • Galata, Karakay Palas, Istanbul, Turkey



3 OF THE 11 HM PUMPS which set maintenance record at Taylor Oil's cat-cracking plant

11 HM pumps run 2 years for Taylor Oil with only 15 hours' special maintenance!

How long?

Two years with just fifteen man-hours for maintenance other than routine checks. This news came as no surprise, however, to the Worthington engineers who designed and built the Type HM pump *specifically* for tough, heavy-duty work. But it's down in black and white in the maintenance records of the Taylor Oil and Gas Company's cat-cracker in Corpus Christi, Texas.

Here are two reasons why these pumps kept going:

1. Centerline support, water-cooled stuffing box and bearing for efficient high temperature duty.
2. Confined casing gaskets and hook-type hardened stainless steel shaft sleeves.

And piping is simplified because the HM is an end-suction design, which also eliminates interference of valving in suction and discharge lines.

Keep the HM in mind for heavy-duty applications. You can have it in carbon steel, alloy steels or cast iron. Get in touch with your nearest Worthington district office or write for free Bulletin W-341-B14 to Worthington Corporation, Centrifugal Pump Division, Harrison, New Jersey. C-4.3

SEE the Worthington Corporation Exhibit in New York City. A lively, informative display of product developments for industry, business and the home. Park Avenue and 41st Street.

WORTHINGTON

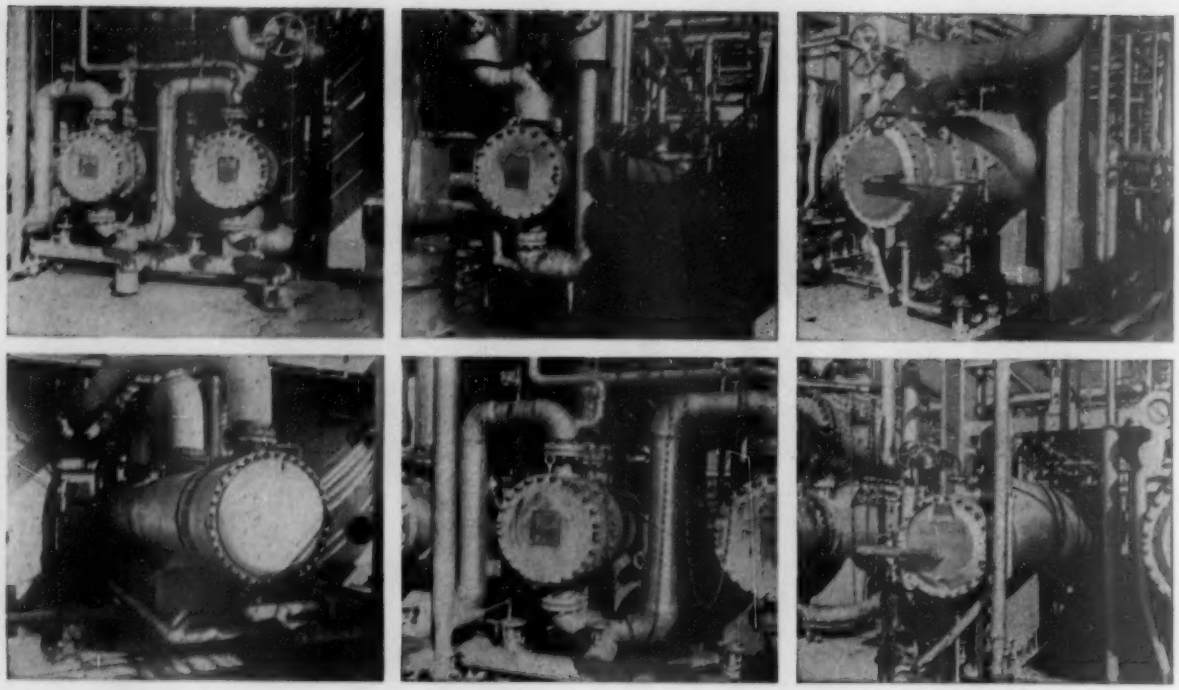
THE WORLD'S BROADEST LINE ASSURES YOU THE RIGHT PUMP FOR EVERY JOB

TYPES HR AND HB. 19 sizes. Capacities up to 1,800 gpm. Developed heads up to 900 ft. Proper selection of material permits use for temperatures far below zero to 800 F, for pressures from high vacuum to 750 psig.

TYPE CNE. For loading or transfer service. Capacities to 2,700 gpm. Heads to 500 ft.

TYPE HM. Available in 12 sizes. Capacities to 700 gpm. Heads to 475 ft. Up to 500 F.

TYPE HD. Hydraulically balanced double-suction impeller handles boiling liquids with low submergence. Capacities range from 600 to 3,200 gpm at heads up to 700 ft. To 850 F. and 550 psig.



DEEP ROCK OIL CORPORATION uses

ELECTRUNITE HEAT EXCHANGER TUBES

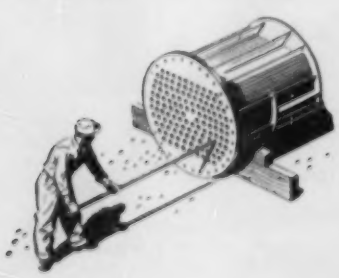
Here are some of the many places at Deep Rock's Cushing, Oklahoma refinery where you'll find Republic ELECTRUNITE Heat Exchanger Tubes.

You'll find ELECTRUNITE Tubing on the job in many other well-known refineries. In fact, petroleum processors have been using it for the past twenty years.

One of the big reasons is ELECTRUNITE quality. And because Republic has complete control from ore to finished tubing, users get extra advantages in the form of tube service life.

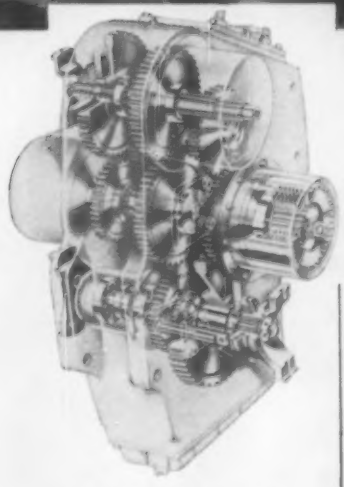
You can have ELECTRUNITE Pressure Tubes in both carbon and stainless steel analyses. Carbon tubes are furnished fully normalized. Stainless Steel tubing is fully solution-annealed. And whether you're planning new installations, or re-tubing, it will pay you to investigate both types. Write for Booklet CEC-54. It's free.

REPUBLIC STEEL CORPORATION
Steel and Tubes Division
219 East 131st Street, Cleveland 8, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York, 17, N. Y.



Republic
REPUBLIC STEEL
ELECTRUNITE
BOILER, CONDENSER AND HEAT EXCHANGER TUBES

Driver's left hand rests on power-shift levers—there's no clutch pedal



Here's the secret of
BIG TIME-SAVINGS:

the MICHIGAN Power-Shift Transmission Forward-Reverse and High-Low gears are in constant mesh. Shifting is accomplished by hydraulic pressure. The power-shift levers on the steering column actuate control valves in the transmission. These valves direct oil pressure to the multiple disc-clutches, transmit engine power from the selected drive gears to the output shaft. Hydraulic oil completely lubricates all drive gears and bearings as it flows from top to bottom and returns to the sump through a fine-mesh screen.

You'll cut your loading time!

with the MICHIGAN Power-Shift Transmission

Operating a MICHIGAN Tractor Shovel is both fast and easy. Gone is the old-fashioned heavy duty foot clutch, gone is the tiresome work of clutching every time you shift gears.

The MICHIGAN Power-Shift Transmission does all the work for you. All you do is operate the finger-tip hand levers on the steering column . . . one for Forward-Reverse, the other for High-Low speed. Make either shift *while moving in either direction without coming to a stop.*

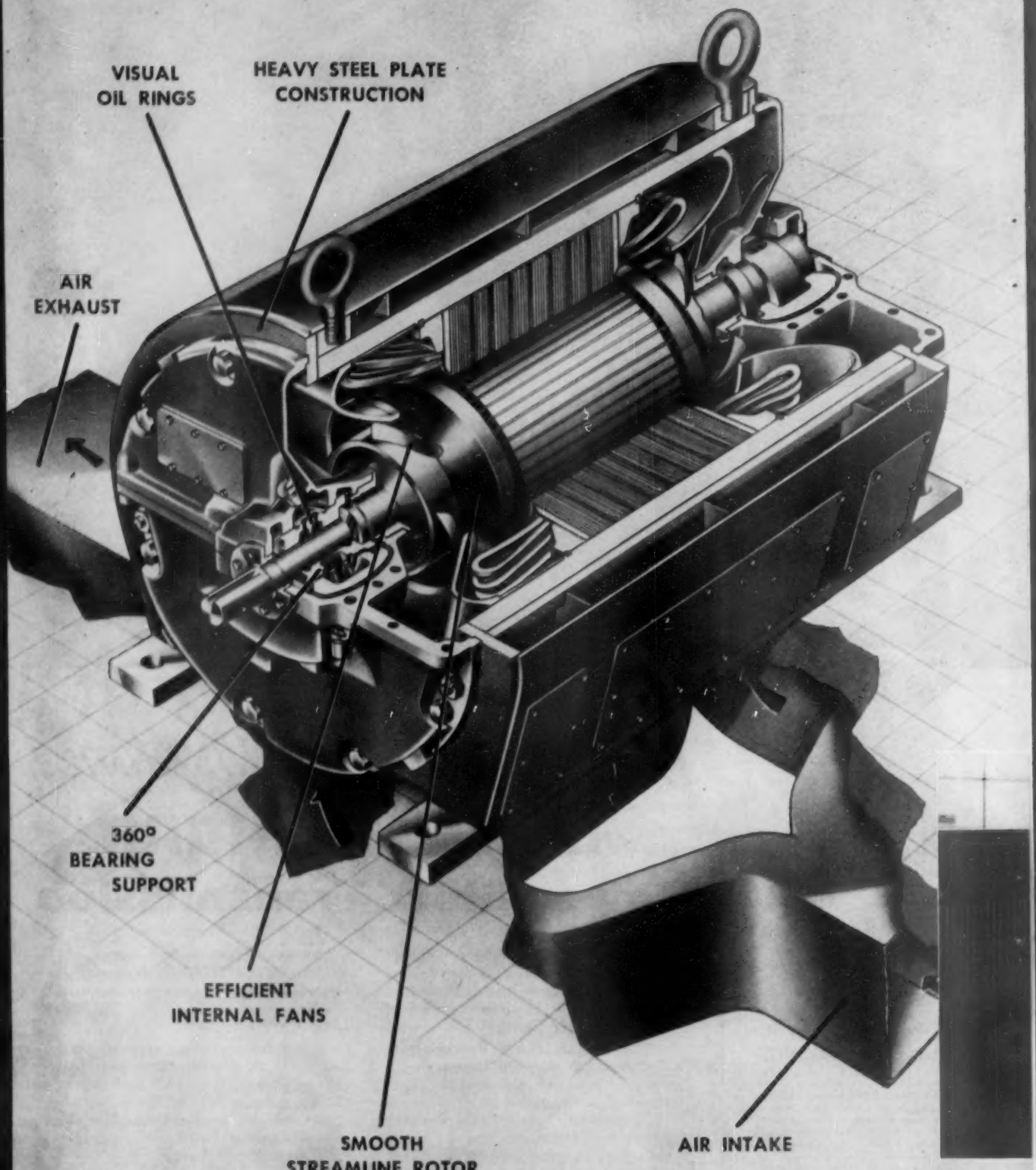
The MICHIGAN'S power-shift transmission speeds up operation, cuts loading time, gets you TOP YARDAGE per day.

Get a demonstration right on your own job. It is easily arranged: just phone your MICHIGAN distributor. Did you know MICHIGAN Tractor Shovels are available under the Clark Leasing Plan? We would be glad to send you full details.

CLARK EQUIPMENT

CLARK EQUIPMENT COMPANY
Construction Machinery Division
448 Second St., Benton Harbor 25, Michigan

G-E two pole motor typical of construction below 1000 h.p.



G-E enclosed base-ventilated motors eliminate ugly piping; need no firewall

Here's a motor that improves the appearance of your pipe-line pumping station. General Electric's enclosed base-ventilated motor has air intake and discharge ducts located below floor level eliminating unsightly piping.

General Electric enclosed base-ventilated motors are built without limitation in size and give you the advantages of low cost and all-around protection. Here are some of the features that make this motor particularly suitable for pipe-line pumping applications.

SIMPLE, ECONOMICAL INSTALLATION—possible because no intervening firewall is needed. This means reduced station construction costs. Also, a more direct connection between motor and pump results in freer movement around motors.

SEPARATE MOTOR-DRIVEN BLOWERS—started up in advance—purge the motor and duct system of any gases that may have accumulated during a shutdown period. It also removes excess motor heat from the station without the use of additional equipment.

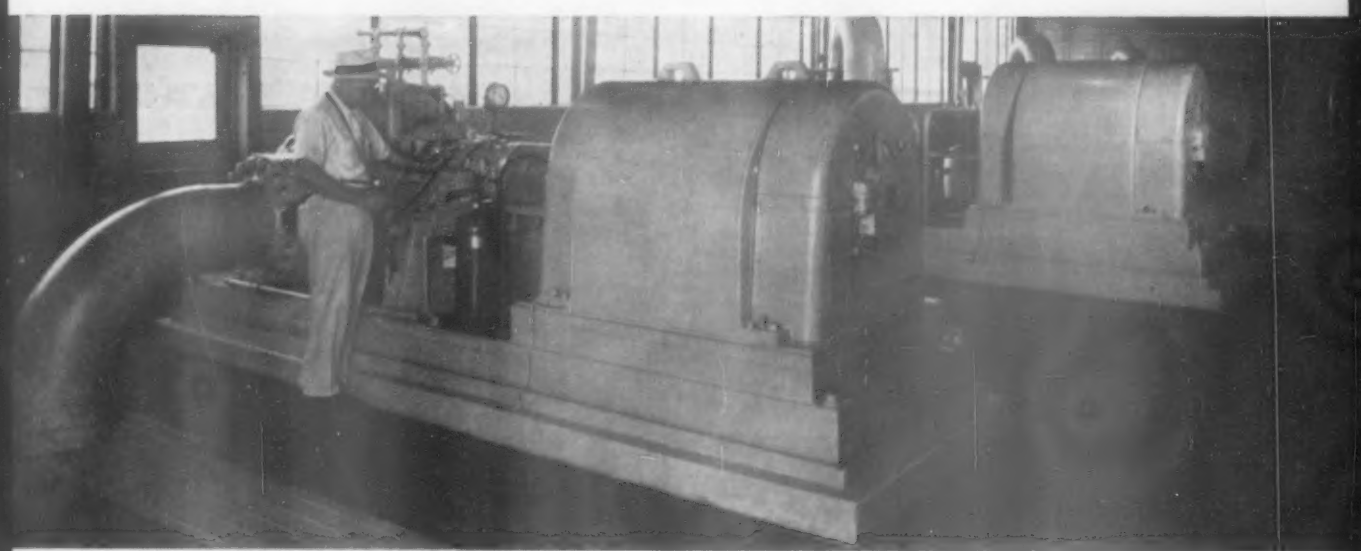
BASE VENTILATION—with intake and discharge ducts opening directly down through the foundation to the source of ventilating air—minimizes the possibility of hazardous leaks from exposed pipe joints.

A WIDE SELECTION from General Electric's complete line of pipe-line motors assures you of getting the right motor for every application. For more information on G-E enclosed base-ventilated motors or any of the complete line, contact your nearest Apparatus Sales Office. *General Electric Co., Schenectady 5, N.Y.*

880-11

Progress Is Our Most Important Product

GENERAL ELECTRIC



AT THE MODERN ELDORADO STATION in the Rancho Pipe-line System, G-E enclosed base-ventilated motors drive single-stage and two-stage pumps. Air ducts are located below floor level eliminating hazardous leaks from exposed pipe joints.

Autocar
COST RECORD BOOK

NOW READY

The Autocar Cost Record Book is a tradition among Autocar users. For the past thirty-two years, Autocar has made this book available to operators of heavy-duty trucks. The Cost Record Book has been continually edited and revised to keep pace with changing methods in accounting and in truck operating. It provides a simple and accurate system for keeping a record of operating costs for each vehicle in a fleet, and for comparing costs, one with another, month by month.

The thirty-third edition of this book is now available. A copy can be obtained by mailing in the coupon below. Our object in publishing it is not entirely altruistic, for it usually serves to reveal to the operator the outstanding economy of his Autocars.

Autocar Division of The White Motor Company, Exton, Pa.

Please send me a free copy of the Autocar Cost Record Book for 1955

Name_____

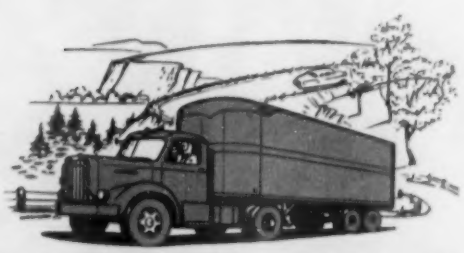
Title_____

Company_____

Street Address_____

City_____ County_____ State_____

1M8

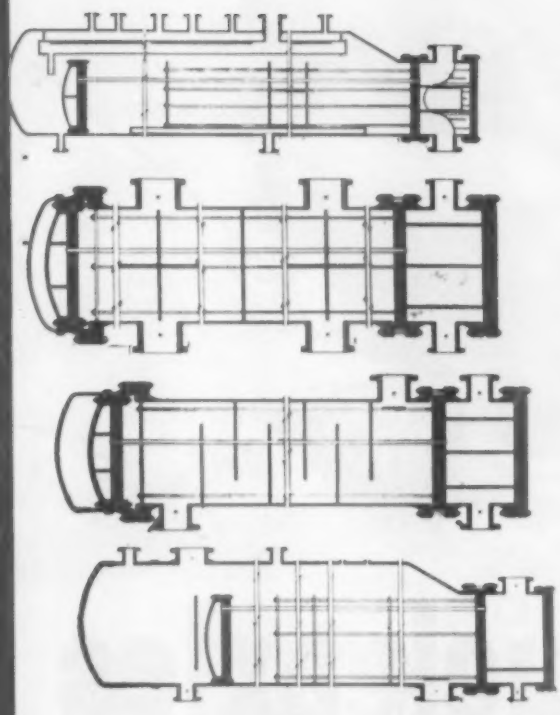


AUTOCAR TRUCKS

AUTOCAR DIVISION OF THE WHITE MOTOR COMPANY
EXTON, PA.

HEAT EXCHANGERS

...a wide variety in any quantity!



Kellogg builds tubular heat exchange equipment in any quantity for many purposes. Literally tens of thousands of exchangers, boilers, coolers, condensers and reflux sections—to mention a few classifications — have come from Kellogg shops. In hundreds of refineries and chemical plants today many of them are still in service . . . new ones are installed every day.

Quantities have run the numerical gamut from one to a thousand or more in a single order. Sizes have ranged upwards from six inches in diameter. Maintenance factors are low; deliveries are prompt. And regardless of what type of heat exchange equipment is required, it is more than likely that Kellogg has built its counterpart before.

Precision, extensive facilities, exclusive research, rigid quality control, top welding performance — these are the factors that make the difference in Kellogg exchangers.

Send for the new booklet, PRECISION FABRICATED HEAT EXCHANGERS FOR THE PROCESS INDUSTRIES. It will not only tell you about the varieties of equipment available from Kellogg but will also show you some of the reasons why you should consider Kellogg when process equipment is required.

JUST OFF THE PRESSES THIS BOOKLET BELONGS IN YOUR FILES

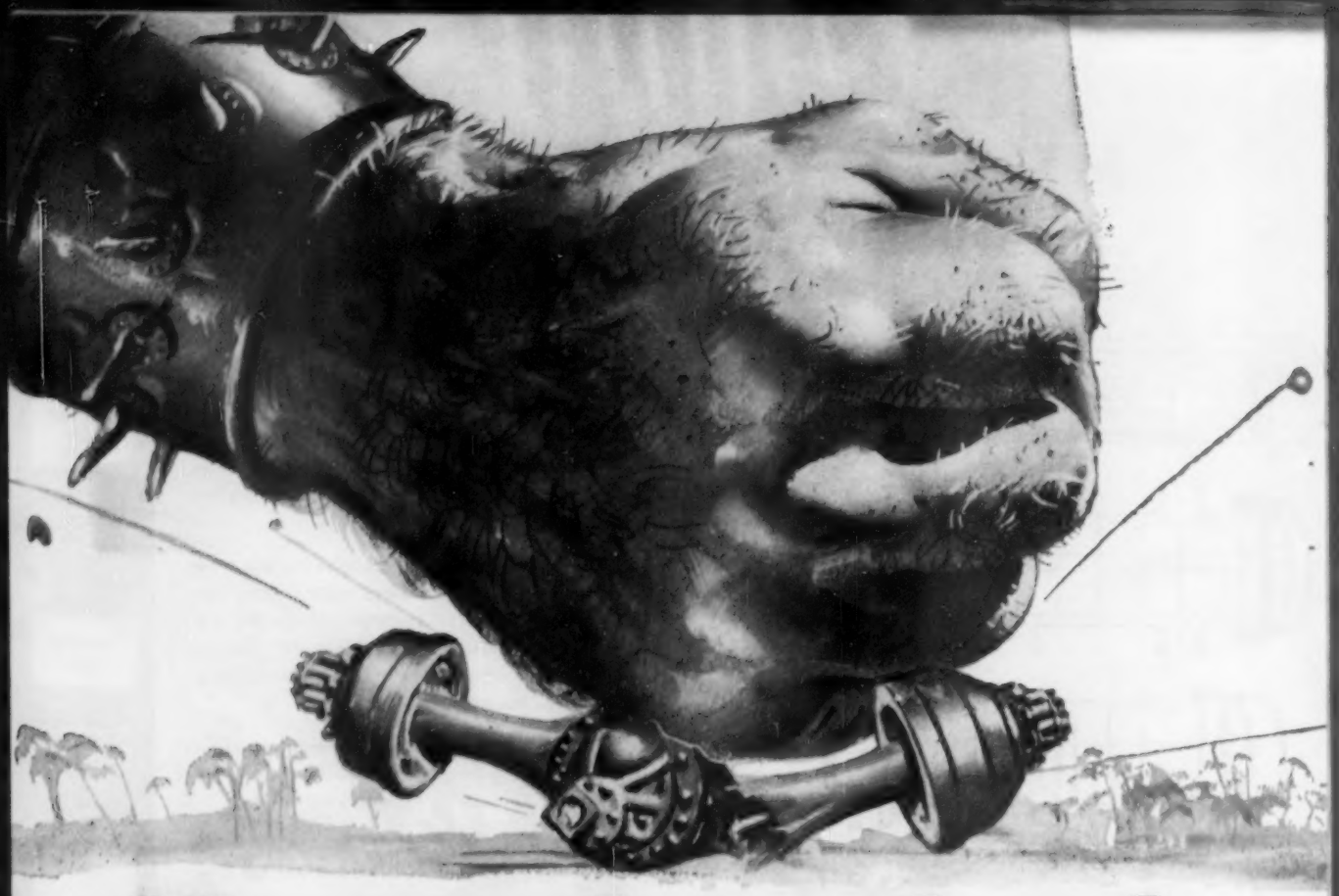
FABRICATED PRODUCTS DIVISION

THE M. W. KELLOGG COMPANY • SUBSIDIARY OF PULLMAN INCORPORATED

225 Broadway, New York 7, N. Y.

In Canada—**The Canadian Kellogg Company, Limited, at Toronto and Edmonton**
In Europe—**Kellogg International Corporation, at London**

KELLOGG
EXCHANGERS
KELLOGG
THIN WALL ALLOY PIPING
KELLOGG
CLAD STEEL VESSELS
KELLOGG
CONDENSERS
KELLOGG
FRACTIONATING TOWERS
KELLOGG
PRESSURE PIPING
KELLOGG
DIGESTORS
KELLOGG
COOLERS



We smash truck axles

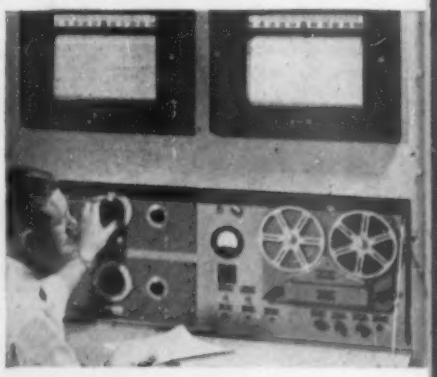
in the new Timken-Detroit indoor proving ground ...and only Timken has it!

We twist, bend, jounce and jerk them. Duplicate every possible operating condition. Then toss in some "torture-tricks" of our own.

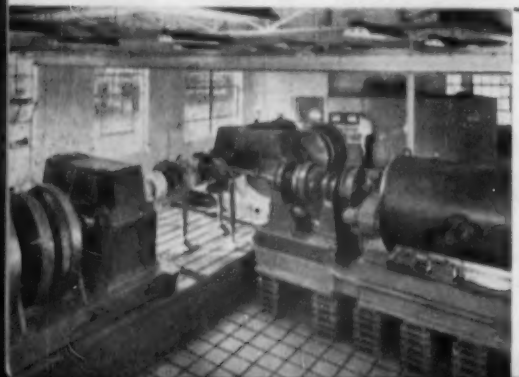
It's calculated destruction! But we know, and can tell you in advance, that a Timken-Detroit axle can take a murderous beating on the job.

Our "Torture Chamber" is a multi-thousand acre proving ground *capsuled into one room!* In it our engineers can put 50 years of experience to work . . . for you . . . experience gained in building axles for trucks, buses, trailers, farm machinery. Stock axles and gearing are subjected *indoors* to any *outdoor* operating condition—under scientific control and analysis.

The result? You enjoy longer axle life; less maintenance, repairs and down-time; lower operating costs, higher profits. Good reasons why Timken-Detroit axles are the choice of the leading manufacturers and owners.



This is our "Torture Tester." He gives axles and gearing the works in the "Torture Chamber." Above him are graphs showing speed and torque performance under any conceivable operating condition. Soft ground . . . twisting roads . . . long grades or fast highway speeds. With special dials, recorders, and electronic devices he actually *drives* the axle with scientific precision—*from his chair!*



How TDA proves axle quality in this "Torture Chamber"

We take an axle out of stock . . . then run a test like twisting the axle shaft 14°, backward and forward—36 times a minute, 24 hours a day, days on end. Or simulate a chuck hole shock every 4 seconds, 24 hours a day for months. Even "bend test" an axle housing for 1,000,000 cycles.

Far greater gear ratio "spread" with TDA 2-SPEED AXLES,

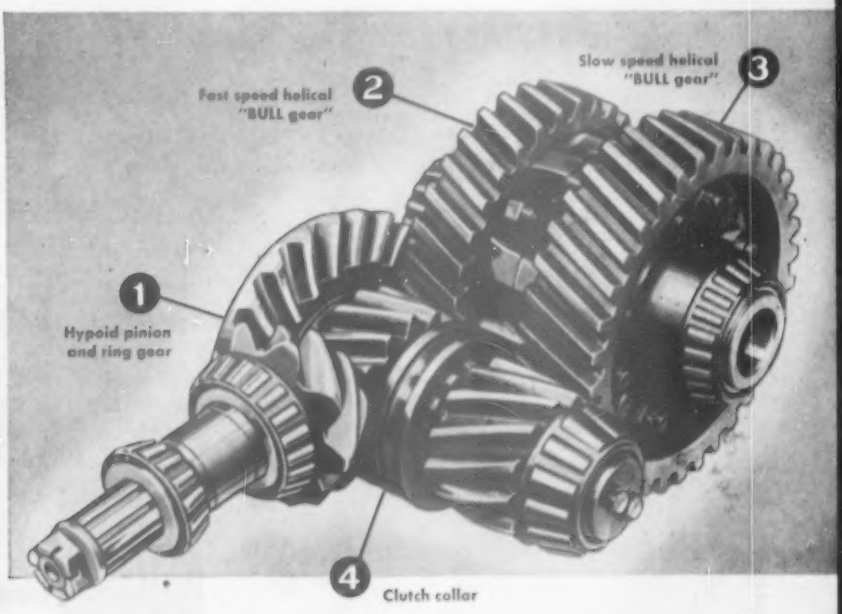
due to exclusive double-reduction design!

Unequalled Flexibility! Only Timken-Detroit 2-Speed axles are available in *three* different ratio "spreads" to meet any transmission-engine combination: 28%, 37% or 49%. Unlike ordinary designs that are limited to 37%, this Timken-Detroit Axle selection may be obtained simply by changing the low speed helical gear set.

Here's How the TDA 2-Speed Principle Works: A husky hypoid ring gear and bigger, stronger pinion set (No. 1 in illustration below) provides the *first step* of the total gear reduction for both fast and slow ratios. Two large, heavy-duty helical gear sets provide the *second step*. Both sets are of balanced size and capacity. One set (No. 2 in illustration below) is for fast speed—the other (No. 3) is for slow speed. The clutch collar (No. 4 in illustration) moves to left or right to engage one helical pinion or the other.

The Result: Complete elimination of small, complicated parts and midget-size gears! Larger hypoid-helical design gives more teeth in contact—reducing load per unit of contact area—for more positive, quiet operation. Bearings are larger. There's longer engine and truck life. When you divide the total gear reduction, you double its life expectancy. The helical pinion not in use idles. TDA gears operate in any ratio *indefinitely* without overheating.

to bits



TIMKEN Detroit AXLES

TIMKEN-DETROIT AXLE DIVISION
ROCKWELL SPRING AND AXLE COMPANY
DETROIT 32, MICHIGAN

The Accepted Standard — TDA — TRADE MARK REGISTERED

"TORTURE-TESTED"
to Save Money on the Job

WORLD'S LARGEST MANUFACTURERS OF AXLES FOR TRUCKS, BUSES AND TRAILERS

Plants at:
Detroit, Michigan
Oshkosh, Wisconsin • Utica, New York
Ashtabula, Kenton and Newark, Ohio
New Castle, Pennsylvania

7 basic axle capacities! Only TDA, world's largest manufacturers of truck, bus and trailer axles, offers a family of 7 basic axle capacities, each with *interchangeable* final drives: single-speed single-reduction—single-speed double-reduction—two-speed double-reduction—using the same axle shafts and housing. Nowhere is there such a selection to fit all needs.

Exclusive "Torsion-Flow" shafts! Forged so that grain structure of steel conforms to shaft profile, thus assuring uniform distribution of stresses. Exclusive heat-treating formula provides a resilient axle-shaft core graduated to a tough, hard outer surface—the ideal combination for axle shaft life. And TDA "Torsion-Flow" shafts are guaranteed for 100,000 miles or 3 years—whichever occurs first.

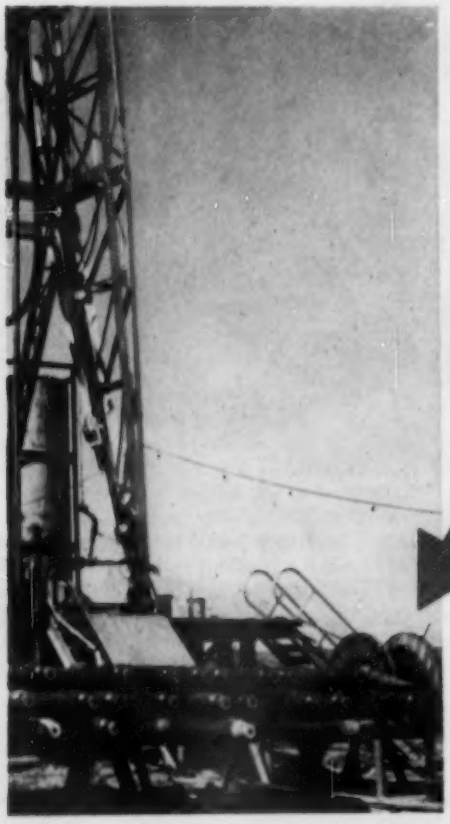
Hot-forged steel housings! Pound for pound the strongest, most rigid ever built! Rectangular TDA housing shape gives maximum strength, uniform stress distribution, minimum weight. Ask about the TDA "Life of Vehicle" guarantee.

TIE YOUR DERRICK TO A SPRINGKORE LINE!

SpringKore is the rotary drilling line of tomorrow! The new principle of a spring center creates and deserves confidence. It resists crushing and contends more successfully with loads, speeds, and well conditions that punish other lines.

When a section of this new line is finally worn out in service, that lubricant-packed spring center is just as round and lively as ever.

It's a lucky crew that drills with a SpringKore Rotary Line.



P·E·S·A
PARTNERS IN PETROLEUM PROGRESS

J&L STEEL

"...here's MY warehouse!"

Jones & Laughlin
STEEL CORPORATION
SUPPLY DIVISION—TULSA, OKLAHOMA
Serving The United States and Canada

Realists take no chances

Fig. 1849 – a small 6" stroke unit with liner sizes from 2½" to 4". Light, compact, complete

Pipeline realists know from experience that they can depend on Gaso for models precisely fitted to their pumping needs. They know from their service records that Gaso Pumps deliver more barrels per dollar for longer periods of time. Can you blame them for refusing to take chances when it's so simple to specify Gaso and be *sure*?

GASO PUMP & BURNER MFG. CO.

TULSA, OKLAHOMA

EXPORT OFFICE: 149 Broadway, New York

LUFKIN MACHINE CO., Ltd., Edmonton, Alberta
W. L. SOMNER COMPANY, Shreveport, Louisiana
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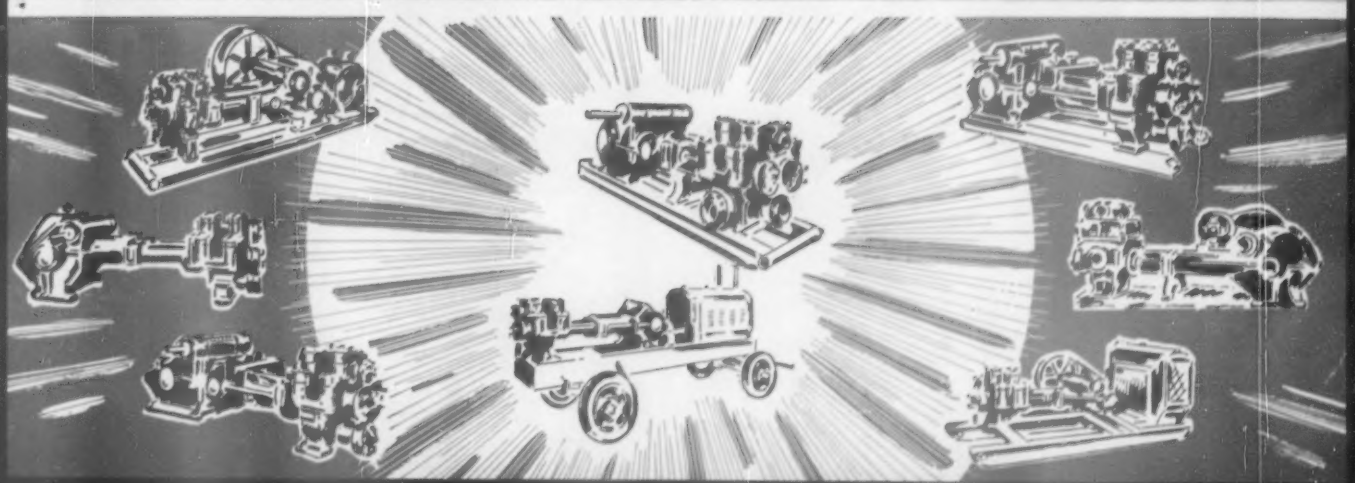
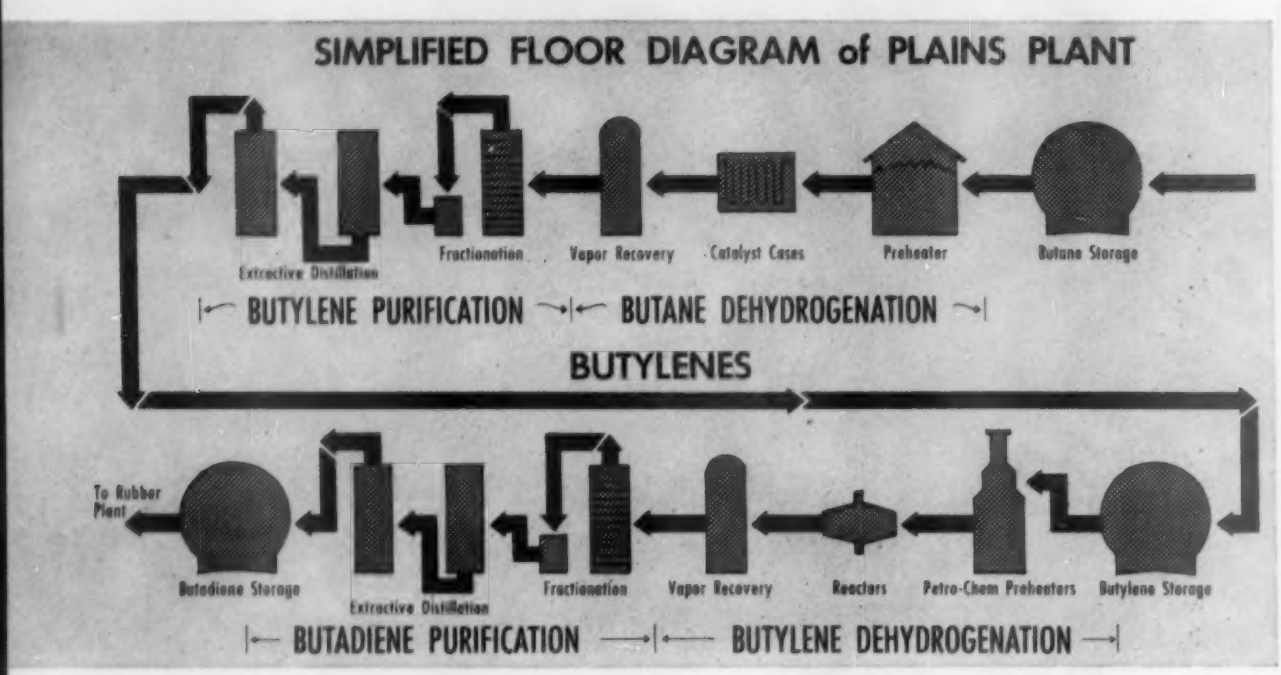
PEDDLERS, INC., Houston, Texas
NORTEX ENGINE & EQUIPMENT CO., Wichita Falls, Texas
LUFKIN FOUNDRY & MACHINE CO., Casper, Wyoming

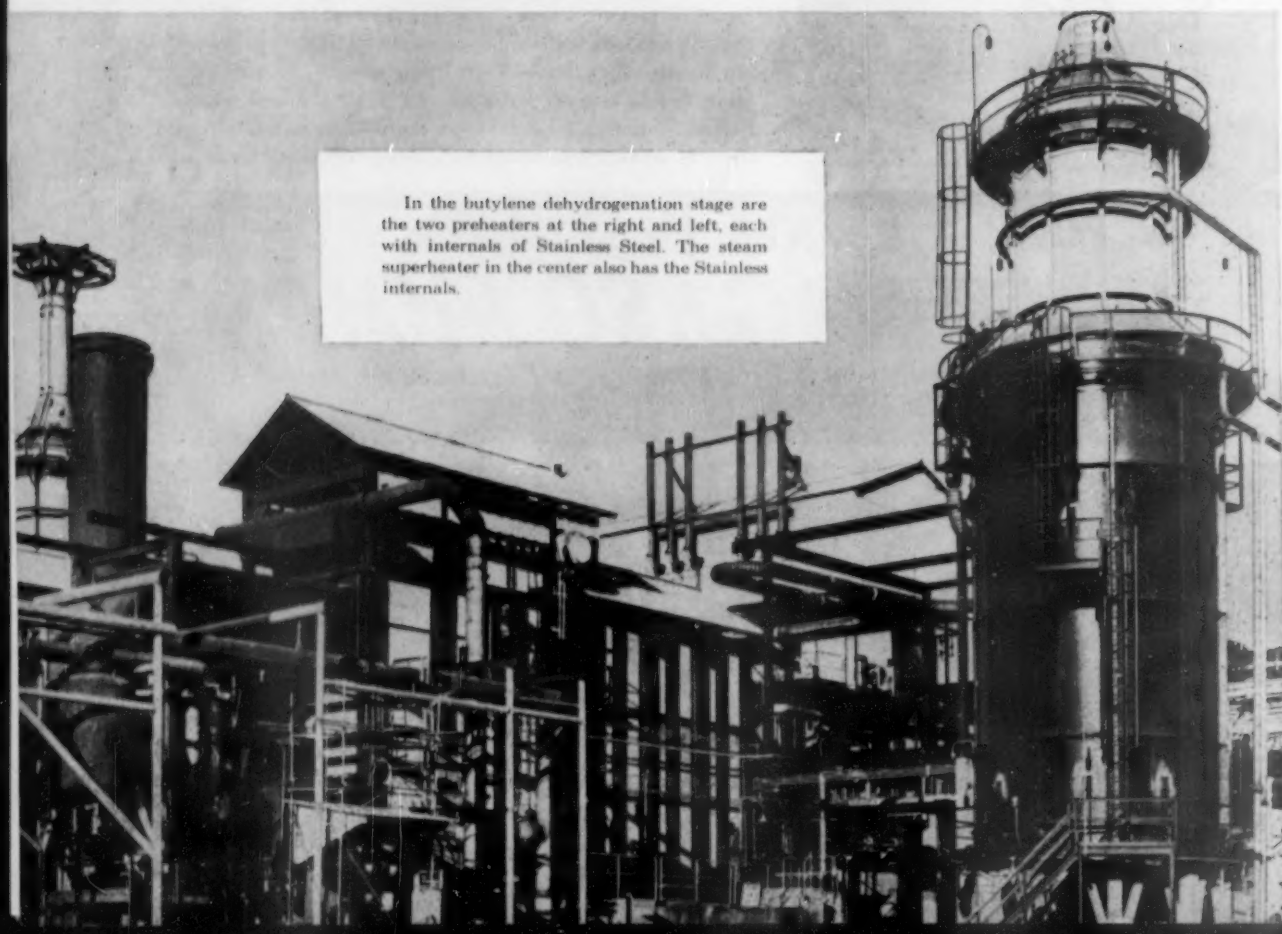
GASO PUMPS

for every oil industry need



How Stainless Steel helps maintain





In the butylene dehydrogenation stage are the two preheaters at the right and left, each with internals of Stainless Steel. The steam superheater in the center also has the Stainless internals.

uninterrupted butadiene production

PETROCHEMICAL processing is like a chain . . . break a single "link" and the entire operation may come to a halt. That's why the most careful attention must be paid to the materials from which key equipment is made. That's why Stainless Steel plays such an important role.

The flow diagram shows the stages in producing butadiene from butane at Plains Plant, Borger, Texas, operated for the Government by Phillips Chemical Company, wholly owned subsidiary of Phillips Petroleum Company. And here are the applications of Stainless Steel in the various stages:

BUTANE DEHYDROGENATION – tubes in the preheater, lines to catalyst harps and their headers, and the catalyst harps themselves. (In this stage, there are 275 Stainless catalyst harps, each weighing 1800 pounds.) Other uses include valves, fans, and, in the regeneration gas blower, turbine blades, nozzle rings and small valves.

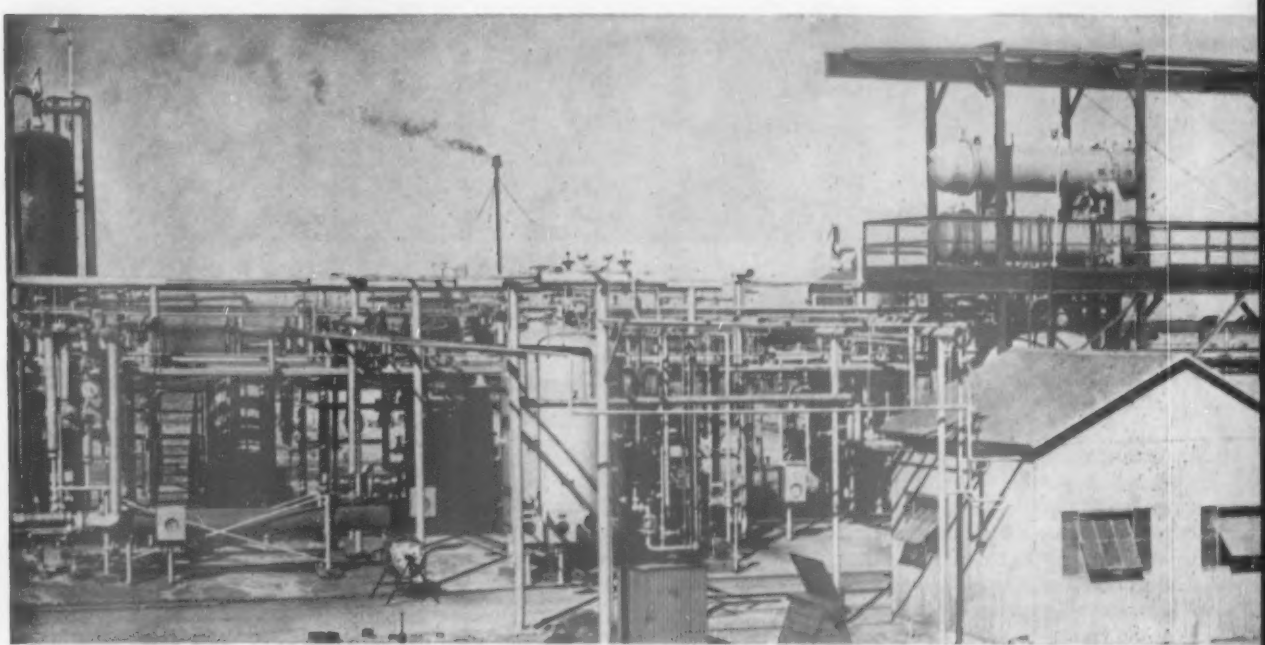
BUTYLENE PURIFICATION–furfural absorbers, bubble caps, risers and lining at the base of fractionating towers.

BUTYLENE DEHYDROGENATION–internals of the feed preheaters and steam superheater, valves to catalyst harps, catalyst harps, valves and fans.

BUTADIENE PURIFICATION–lining of evaporator, agitator piping, rerun stripper and numerous valves.

Some of the Stainless Steel in this plant was made by United States Steel–some came from other sources. But whatever its source, Stainless Steel's strength at elevated temperatures and its superior resistance to corrosion made it a wise selection. In every case, the operating conditions determine the exact composition of the Stainless used.

There is a grade of perfected, service-tested USS Stainless Steel suitable for every application. Our representatives will be glad to work with you in determining the grade best suited for each individual job.



Furfural rerun unit. The stripper at the extreme left is lined with Stainless and has five trays of the same material. The evaporator located to the left of the flare is Stainless Steel, too.

UNITED STATES STEEL CORPORATION, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS · BILLETS USS PIPE · TUBES · WIRE · SPECIAL SECTIONS

4-295

UNITED STATES STEEL

MUSCLES OF STEEL

put the mules out of business

Oldtimers in coal mining can remember when mule-power was the only means of transportation in the mines.

Today's efficient coal mining demands big-capacity mechanized equipment. In modern underground mines, wire rope serves as *muscles of steel*—pulling cars from the loader to discharge point. In strip mining, also, wire rope provides the *muscle* for huge stripping shovels.

No matter what the job may be—wherever there's need for *muscles of steel*—it's a safe bet that Wickwire Rope is busy at work. In the mines and the quarries. In the logging camps and the oil fields. With the fishing fleets and in materials handling. In all of these fields, Wickwire Rope has a record of economical and dependable performance that can't be beat.

***every* industry benefits from wire rope**

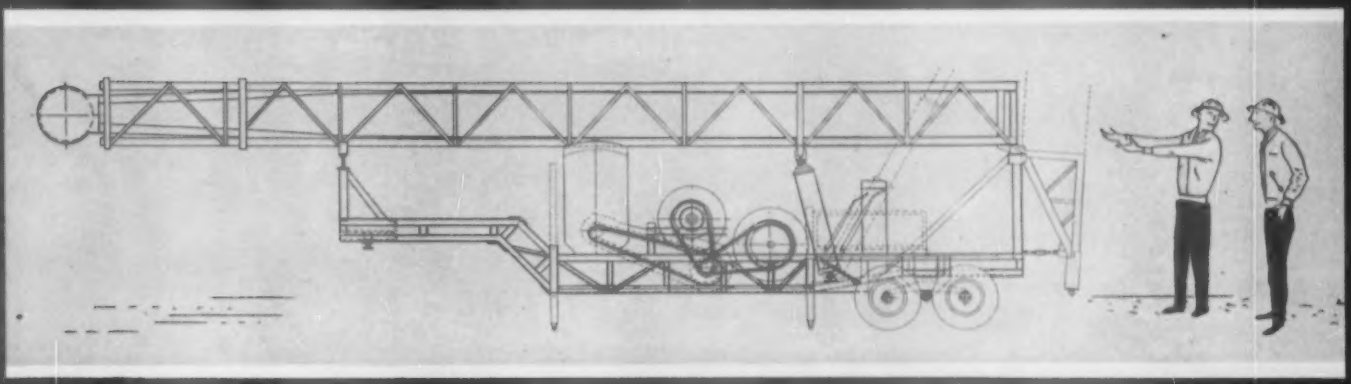
WICKWIRE ROPE

CF&I PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

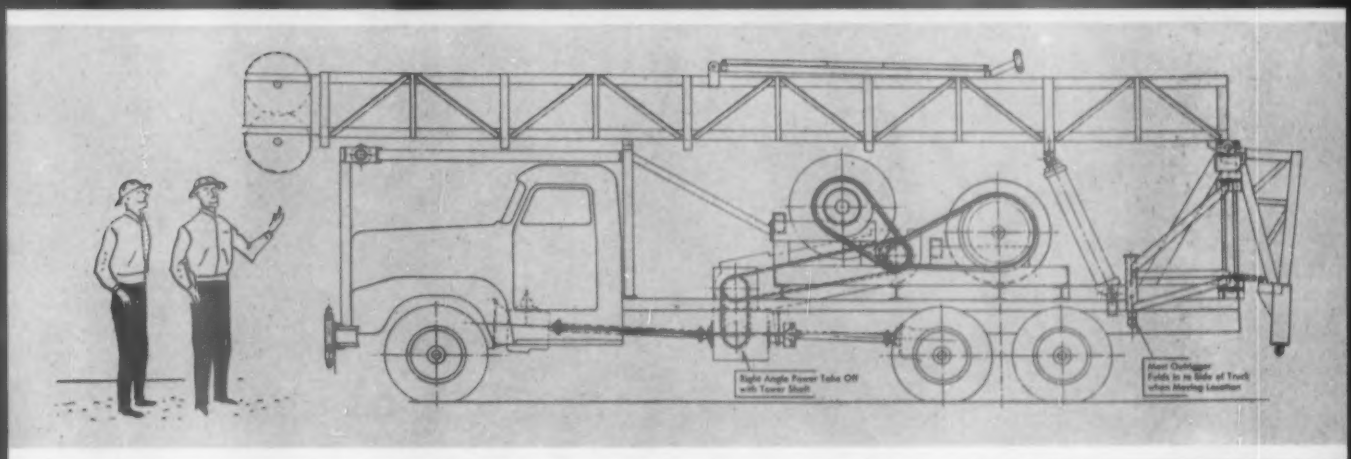
2695

THE COLORADO FUEL AND IRON CORPORATION—Abilene (Tex.) • Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
PACIFIC COAST DIVISION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) • New Orleans • New York • Philadelphia

Pick the Winch Drive System You Want



WILSON MANUFACTURES BOTH



Wilson built winches on trucks, with power-take-offs, of Wilson make as early as 1928, and several thousand of these were made, but these were discontinued just before the war because most customers preferred the separate engine.

Recent state restrictions on weight and size have forced well servicing contractors and other users to ask for a "good power-take-off" that will "stand the gaff" of rugged oil field service with a very minimum of "down time" and maintenance cost. We have now designed, field tested and proved what our customers have told us is *"the best heavy-duty truck power-take-off ever built."* It incorporates many new features never before available in any power-take-off and is built so that is can be used in any make or size of heavy truck.

For the first time users can now obtain a *Modern* High Capacity Mast, with a *Modern* Heavy Duty Air Tube Clutch Drum Winch, with High and Low Clutch drum speeds, and new lightweight clutches which never need adjustment; with this truly *Modern* "1954 Model" Power-Take-Off! And these new units are legal as regards to length, width and height, and *weight distribution!* The Super 38 Double drum units with tubular masts and the usual amount of lines and tools can be made legal in most states. Fabricated Masts on *double drum* units with lines and tools may require permits.

BE MODERN — BUY WILSON

The Lightest, Strongest, Best!

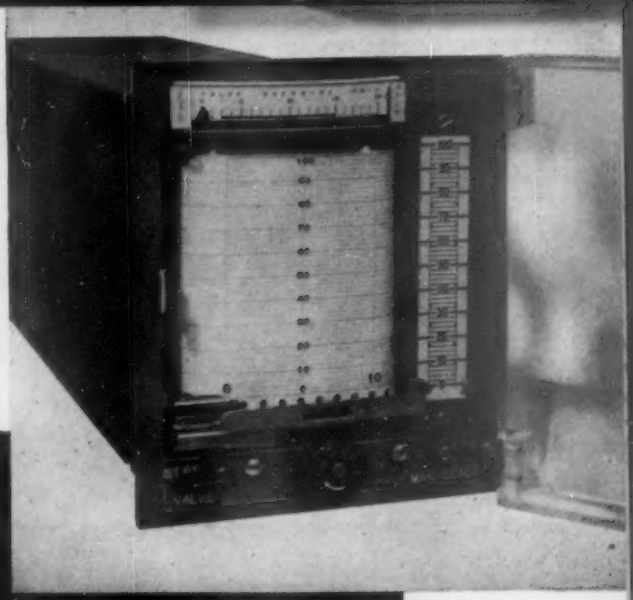
Wilson

The FIRST NAME in OIL FIELD WINCHES

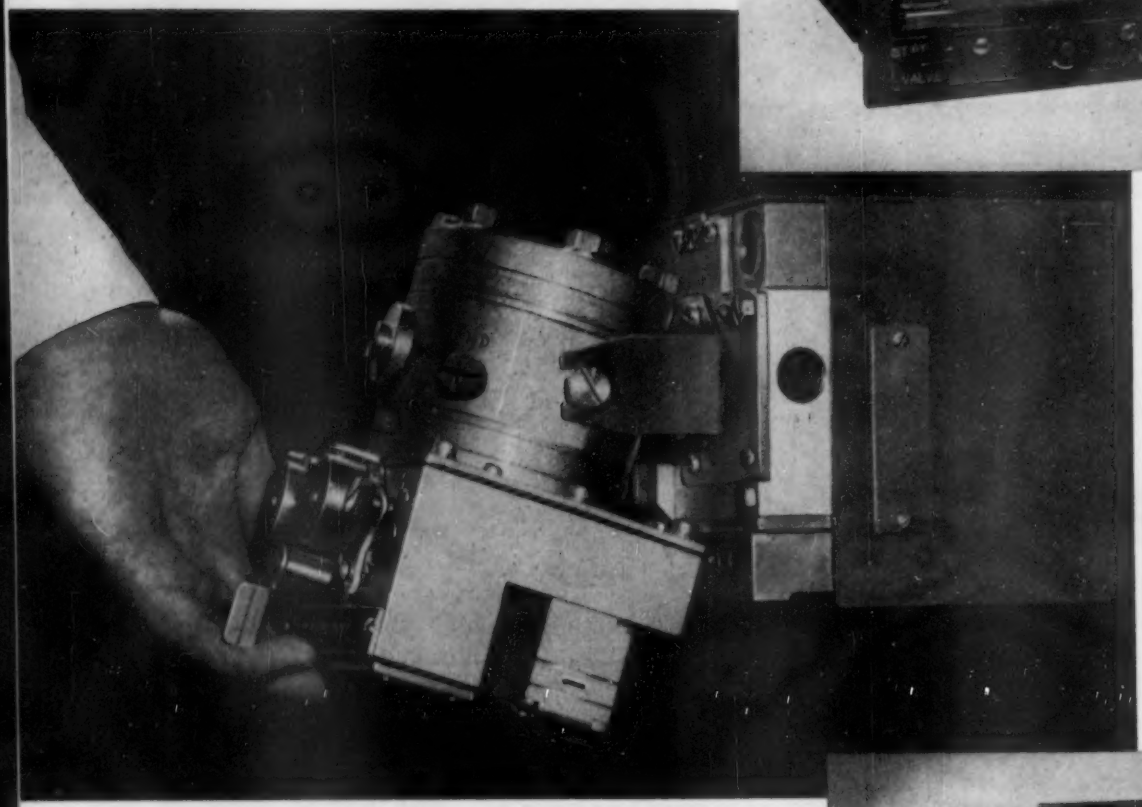
WILSON MANUFACTURING CO., Inc.

The HOME of RED IRON • WICHITA FALLS, TEXAS

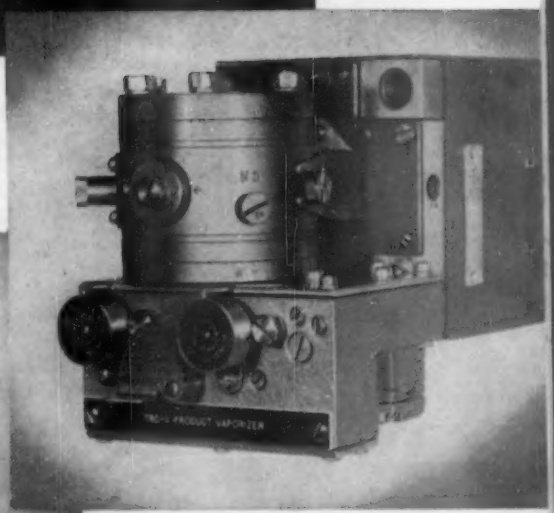
Horizontal scale above chart provides continuous indication of control air pressure to valve.

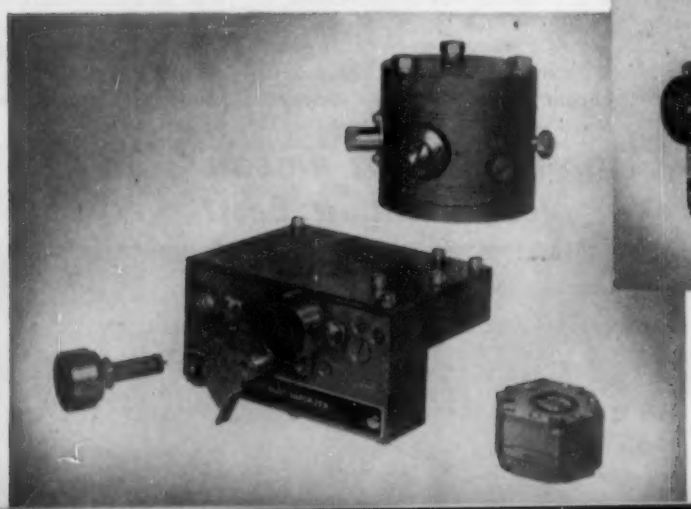


Quick-connect controller mounting . . . for added protection the controller is supported by a yoke when disconnected.



All adjustments are readily accessible from the rear of the controller.





Unitized construction of all major components simplifies maintenance . . . makes re-assembly foolproof.

Today's Tel-O-Set* instruments are easiest to install . . . operate . . . service

THE latest improvements in the *Tel-O-Set* family of miniature recorders and controllers make them the simplest and most convenient ever. Operating men, installers and service men alike will appreciate these outstanding features:

Quick-connect mounting—either on back of recorder, back of panel, or at a remote location. A single lever opens or closes all interconnecting air lines . . . allows the controller to be removed without interfering with manual control of the process.

Foolproof connect and disconnect. The rear of the recorder is a flat gasketed surface that matches up perfectly with the controller. It's completely free of any protruding valve stems or plug-in fittings that might be damaged in shipping or handling in your plant. Self-contained air switch must be shut off before the controller can be removed.

Leakproof design—with large capacity valves.

Wide range of reset rates. A single instrument provides a simple choice of three different ranges . . . fast, intermediate and slow . . . enabling one basic model to serve in applications formerly requiring several models.

Versatility. Rate action is readily added. When equipped with a manifold, the controller can be mounted remotely, either back of the panel or in the field.

Low air consumption—less than 0.2 scfm.

Unitized construction—permits fast, easy removal and replacement of major sections.

Compare the features . . . and the operating characteristics . . . of the *Tel-O-Set* line of instruments. You'll find they represent the top in value in miniature instrumentation, that will give you the top in performance and serviceability on your process control panels. For a discussion of your specific requirements, call your nearby Honeywell sales engineer . . . he's as near to you as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, Wayne and Windrim Avenues, Philadelphia 44, Pa.

● REFERENCE DATA: Write for your copy of new Bulletin No. 7201, "Quick-Connect *Tel-O-Set* Instruments."

**Tel-O-Set* is a trade mark of the Minneapolis-Honeywell Regulator Co.*

MINNEAPOLIS
Honeywell
BROWN INSTRUMENTS
First in Controls

OPENING NEW HORIZONS IN ACCURACY!

Now tank farms and refineries can maintain at least 100% greater accuracy with the new Gilbarco Electronic Tank Gauge. *No other tank gauge today* offers all these advantages for liquid measurement:

★ **Accurate** to 1/16 of an inch.

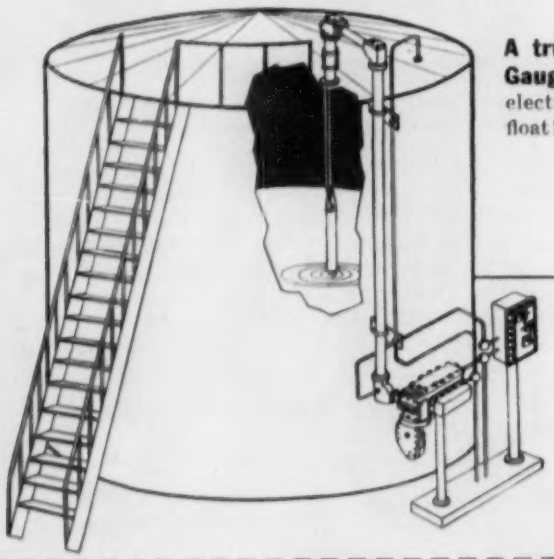
★ **Exterior Installation** and maintenance, without taking tank out of service.

★ **Not affected** by variations in specific gravity or viscosity.

★ **Can be used** in any type of low pressure tank.

★ **Can be supplied** with automatic switches and an instrument to indicate the average temperature of the product.

★ **Remote reading** equipment available for accurately transmitting temperature and liquid level data.



A truly Electronic Tank Gauge – actually *measures* electronically, not with a float!

For assured accuracy... get all the facts on the new Gilbarco Electronic Tank Gauge today!

GILBERT & BARKER MANUFACTURING CO.
West Springfield, Mass.

Please send us complete information on the Gilbarco Electronic Tank Gauge.

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COMPANY _____

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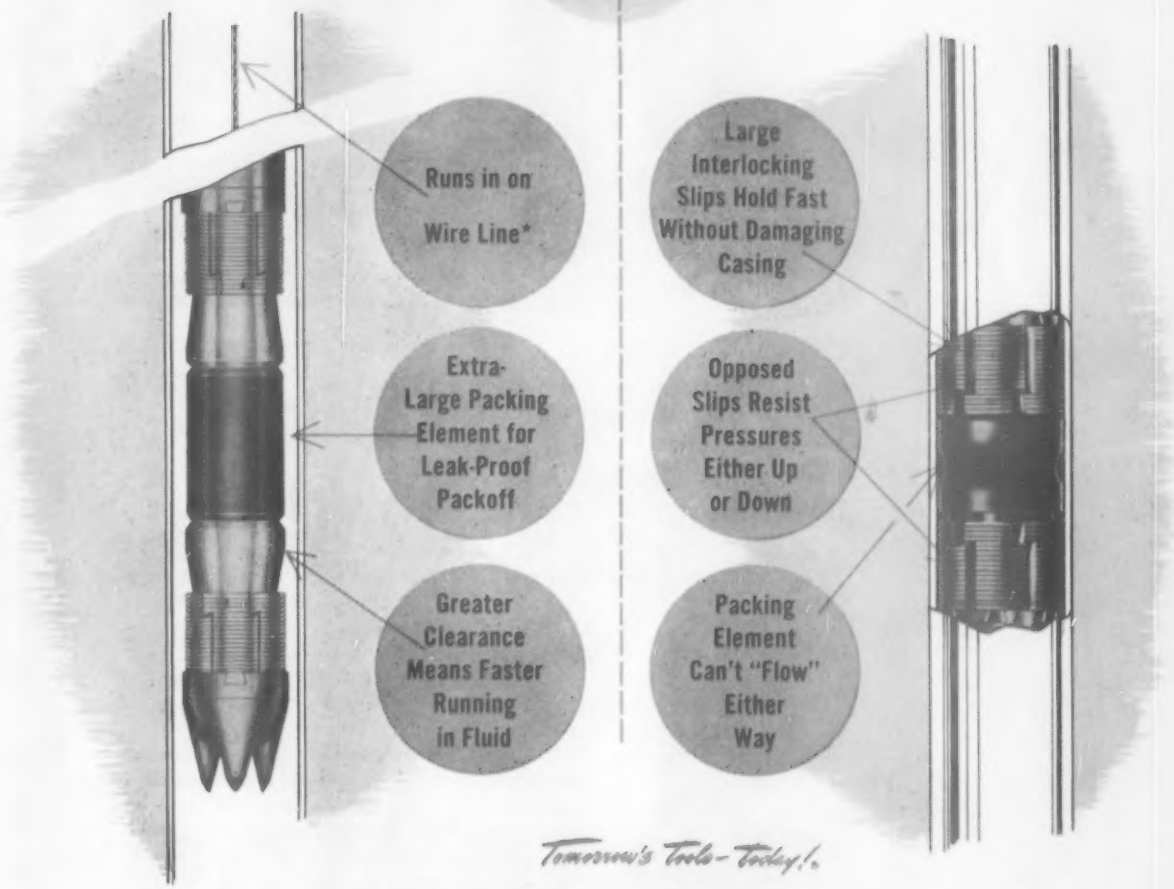
Gilbarco

West Springfield, Mass.
Toronto, Canada

Let's Look

at the **operating advantages**

of these bridging plugs


Runs in on Wire Line*
Extra-Large Packing Element for Leak-Proof Packoff
Greater Clearance Means Faster Running in Fluid
Large Interlocking Slips Hold Fast Without Damaging Casing
Opposed Slips Resist Pressures Either Up or Down
Packing Element Can't "Flow" Either Way

Tomorrow's Tools - Today!

2 models *to fit every need*

MAGNESIUM for fastest drill-out... 1 to 3 hours. Plugs rated up to 6,000 p.s.i.

CAST IRON, rated up to 10,000 p.s.i. Outlasts casing in permanent installations, yet drills out or knocks down in 4 to 6 hours.

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*L-W Hoist Trucks at 72 field locations

Drillable - Wireline Bridging Plugs

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AU-708

"Me Switch? ...Never!"

"OK! SO I AM PIG-HEADED! I gave up trying other ropes years ago. It pays me to standardize on Roebling. Why? Well, with Roebling I get exactly the type of rope I need, when and where I need it . . . no makeshifts . . . no delays . . . and the performance is tops."

* * *

Why not find out for yourself? Call your nearest Roebling office or distributor for a Field Man. He'll recommend the ropes that perform and stand up best in the oil fields. And you'll learn what service really means! District Offices at Cleveland, Denver, Houston, Los Angeles, Odessa and Tulsa.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

THERE'S A ROEBLING DISTRIBUTOR IN YOUR PHONE BOOK

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J.

KING SIZE

This giant 37 ton Cat Poly Reactor is one of 4 units shipped to a large petroleum refinery in the State of Washington. It is 4'-3½" in diameter by 32'-0" long and has a 1 3/16" thick shell. Each of its 8" thick heads is attached to the shell channel with 28 special alloy stud bolts 2¾" diameter by 15¼" long having nuts 4¼" across the flats. Into the 5¾" thick tube sheets 190 tubes, 2½" O. D., No. 5 gauge and 30'-0" long, are rolled and seal welded. Designed for 1,230 lbs. pressure on the tube side, the reactor was completely X-rayed and stress relieved.

Vogt, a leading builder of shell and tube reactors for poly plants, has the competently skilled personnel and modern mechanical facilities with which to provide heat transfer equipment for the most exacting services in petroleum refineries, chemical plants, and related industries.

Reactors ...by Vogt

A bulletin describing the wide range of heat transfer equipment built by Vogt is available upon request.

HENRY VOGT MACHINE CO., LOUISVILLE, KENTUCKY

BRANCH OFFICES: NEW YORK, CHICAGO, CLEVELAND, DALLAS, PHILADELPHIA, ST. LOUIS, CHARLESTON, W. VA.

NEW CHEVROLET TRUCKS

keep going longer, keep going for less!

From the day you first put it on the job until the time comes to trade, your Chevrolet truck's going to do more work for you while you spend less to keep it going. Here's why you can count on it—

INCREASED POWER SAVES YOU PLENTY

Chevrolet's high compression ratio (in each of its three great engines) develops more power. That means you go longer before filling the tank! It means, too, you've got extra power handy whenever you need it—for greater acceleration, for an easier pull up steep grades, for steadier going through mud and sand on off-the-road jobs. So, you save not only on operating costs—you save *time* as well.

GREATER RUGGEDNESS PAYS OFF IN LONGER LIFE

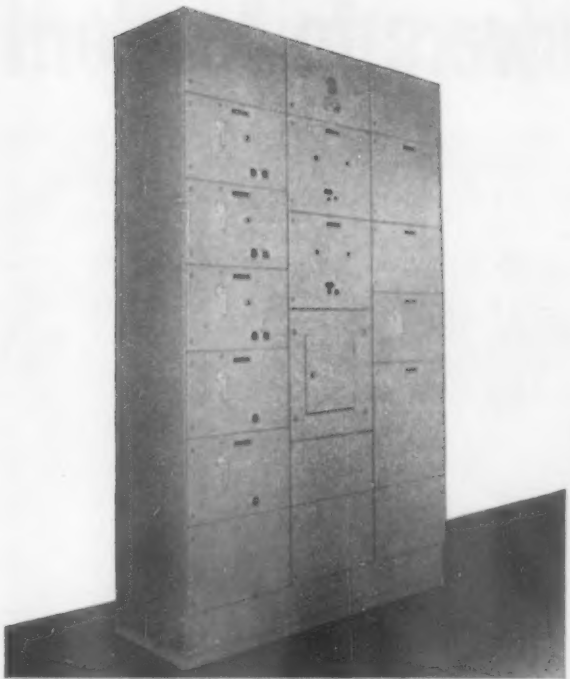
Two-ton models, for example, are equipped with heavier axle shafts. All models have newly designed clutches and stronger frames. The best part of it is that, throughout their longer life, you spend less for their upkeep. For complete details about the model you need, see your Chevrolet dealer. He'll tell you whatever you want to know, then give you the best news of all: Chevrolet trucks are priced lower than all other lines! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

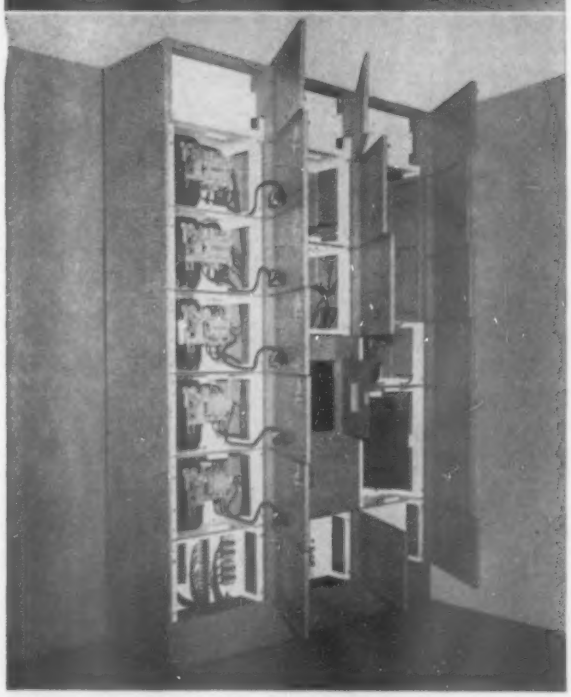
MOST TRUSTWORTHY TRUCKS ON ANY JOB! CHEVROLET

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

THREE GREAT ENGINES—The new "Jobmaster 261" engine* for extra heavy hauling. The "Thriftmaster 235" or "Loadmaster 235" for light-, medium- and heavy-duty hauling. **NEW TRUCK HYDRA-MATIC TRANSMISSION***—offered on ½-, ¾- and 1-ton models. Heavy-Duty **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **DIAPHRAGM SPRING CLUTCH**—improved-action engagement. **HYPOID REAR AXLE**—for longer life on all models. **TORQUE-ACTION BRAKES**—on all wheels on light- and medium-duty models. **TWIN-ACTION REAR WHEEL BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—greater holding ability on heavy-duty models. **NEW RIDE CONTROL SEAT***—eliminates backrubbing. **NEW, LARGER UNIT-DESIGNED PICKUP AND PLATFORM STAKE BODIES**—give increased load space. **COMFORTMASTER CAB**—offers greater comfort, convenience and safety. **PANORAMIC WINDSHIELD**—for increased driver vision. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—easier, safer handling. **ADVANCE-DESIGN STYLING**—rugged, handsome appearance.

**Optional at extra cost. Ride Control Seat is available on all cabs of 1½- and 2-ton models, standard cabs only in other models. "Jobmaster 261" engine available on 2-ton models, truck Hydra-Matic transmission on ½-, ¾- and 1-ton models.*





The Problem:

RUNNING A BIG PLANT WITH LIMITED PERSONNEL

A CITY FINDS The Answer:

ARROW-HART Control Centers

The City of Meriden, Connecticut was faced with the problem of running its new sewage disposal plant efficiently with limited personnel. An Arrow-Hart Control Center . . . laid out by John P. Legnos, Associates, consulting engineers on the job . . . helped to provide the answer. Magnetic controls for the sewerage and water seal pumps, recording meters that indicate the time the pumps have run, and controls for the unit heaters in the building are all combined in a single, compact A-H Control Center. Both operation and maintenance are handled easily and effectively.

A-H CONTROL CENTERS offer THESE IMPORTANT ADVANTAGES . . .

- **BIGGER SPACE SAVINGS** . . . up to 50% more than any other type, thanks to A-H "Advanced Design" Controls.
- **ADDED FLEXIBILITY** . . . much smaller A-H Controls permit rating increases up to 30 hp without increasing compartment size.
- **GREATER SAFETY** . . . with dead-front construction, all buses and wires completely enclosed; *plus* external handle mechanism that prevents door opening unless the disconnect is in the safe "OFF" position.
- **IMPROVED PERFORMANCE, DEPENDABILITY** . . . are assured by exclusive Arrow-Hart "Right Angle" Starter Design.
- **EASIER MAINTENANCE** . . . all controls are grouped in a single location. Each Control Unit offers Straight-Thru Wiring with all parts easily accessible from the front.

WRITE NOW FOR COMPLETE INFORMATION . . . SEE HOW ARROW-HART CONTROL CENTERS CAN HELP YOU FIND THE SIMPLE ANSWER TO YOUR COMPLEX CONTROL PROBLEMS.

SINCE 1890

ARROW • HART
INDUSTRIAL CONTROL DIVISION
103 HAWTHORN ST., HARTFORD 6, CONN., U.S.A.

Offices, sales engineers and warehouses in: Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Dallas, Detroit, Houston, Indianapolis, Los Angeles, Milwaukee, Minneapolis, New York, Philadelphia, Pittsburgh, St. Louis, San Francisco. In Canada: Arrow-Hart & Hegeman (Canada) Ltd., Mt. Dennis, Toronto. In England: Arrow Electric Switches, Ltd., Ealing, London W5.

Quality MOTOR CONTROLS • WIRING DEVICES
ENCLOSED SWITCHES • APPLIANCE SWITCHES

INDUSTRIAL CONTROL DIVISION
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Please send my free copy of Folder CC-44 that includes complete information on Arrow-Hart Control Centers.

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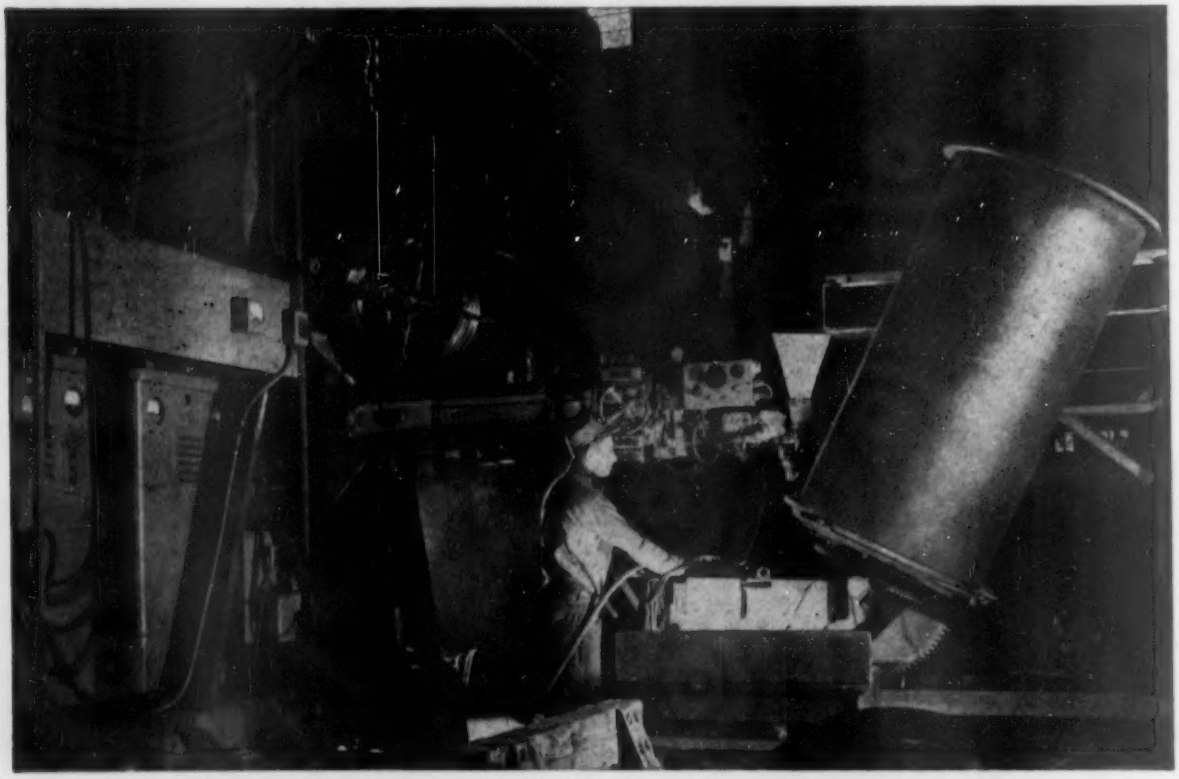
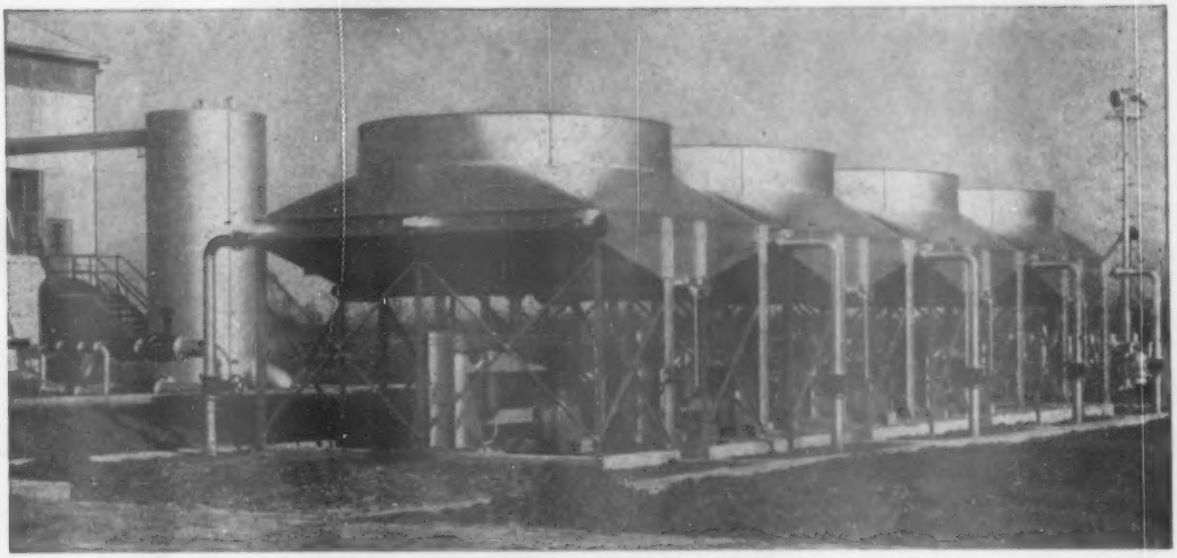
Profit-building answers to Modern

. . . examples of the wide variety of equipment designed and built by Alco to meet today's demands in petroleum and petrochemical processing . . . results of **Alco Experience** . . . gained through many years of designing and building equipment for refining and processing companies the world over . . . and **Alco Facilities** . . . capable of handling economically an extremely wide range of metal-fabricating operations . . . of meeting strictest customer requirements.

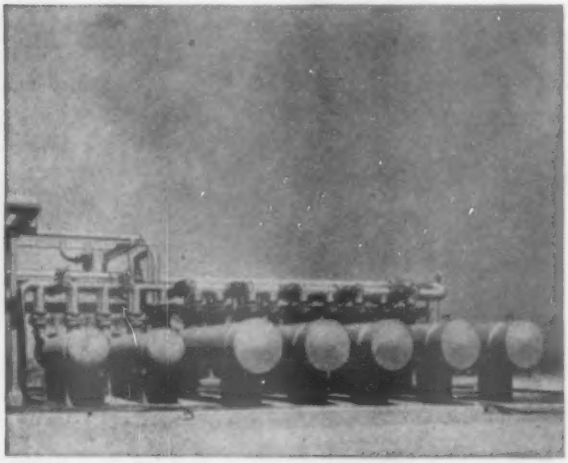


TOUGH FABRICATING JOBS are handled with ease in Alco's fully equipped shops, where virtually any type of equipment can be built at realistic low cost. Here a section of steel pipe, mounted on a universal-position pedestal, has flanges attached by submerged arc welding

Processing problems



JACKET WATER COOLING for compressor engines on cross-country pipeline is efficiently performed by Alco Aircoolers even during summer's high ambient temperatures. Available in radiator-core and fin-tube types, Alco Aircoolers offer lower costs in scores of applications.



ALCO GAS COOLERS serve two absorption towers working in parallel at Lion Oil Company's Diamond M-Sharon Ridge gasoline plant near Snyder, Texas. Geared to produce 375,000 gal of petroleum products per day, Diamond M uses 39 Alco shell-and-tube heat exchangers of 21 separate types.

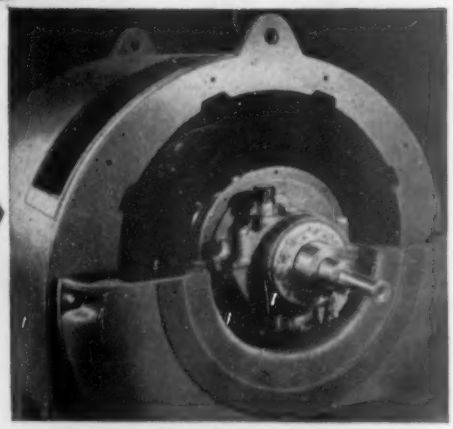
GRANGEMOUTH, SCOTLAND, is one of the world's oldest petroleum refining centers, with shale oil processing dating back over 100 years. At this historic site, Anglo-Iranian's refinery included 18 types of Alco heat-exchange equipment in its extensive expansion and modernization program.

How about your processing problems? Is heavy-duty service a factor? If so, contact your nearest Alco sales representative today —as the first step toward profit-building answers for you.

ALCO
PRODUCTS
AMERICAN LOCOMOTIVE COMPANY
Sales and Service Offices in Principal Cities

new DESIGN...

more protection with full accessibility



* New Allis-Chalmers slip-ring motor with inspection cover and upper half of end shield removed. Note accessibility of brushes, protection of bearing.

ALLIS-CHALMERS LARGE SIZE SYNCHRONOUS AND WOUND-ROTOR MOTORS have been completely redesigned with longer stator yokes and shorter end shields. Collectors and brushes are located inside the yoke for protection against physical damage, dripping moisture, dust and dirt.

Capsule-type bearings give better bearing protection, too. The upper half of the end shield may be removed for inspection or cleaning of the interior of the motor without disturbing the exciter or exposing the bearing to the ravages of dirt, dust and oil contamination.

All leads enclosed — Both primary and secondary winding leads are brought out through separate conduit boxes. There is no loose wiring . . . no exposed leads anywhere.

Easy maintenance — Even though the new design offers maximum protection to brushes and collectors, internal parts are fully accessible for inspection and maintenance through large openings in the stator yoke. Opening covers are readily removed and are secured during operation by easy-operating, self-locking fasteners.

Get details now — This new design is available from approximately 250 hp at 300 rpm and up, in drip-proof and splash-proof construction. Call your Allis-Chalmers representative for complete details or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 05R8183.

A-4464

ALLIS-CHALMERS

They Say—

More Reserves Needed

"It seems to us that even when allowing for more rapid development of atomic power than is contemplated by the best informed on this subject, the principal problem of the oil industry will be to expand its resources sufficiently to keep up with the growing demand.

R. G. FOLLIS

"In addition to supplies that can be expected from the American continents, the free world will undoubtedly require heavy withdrawals from the reserves of the Eastern Hemisphere. This confirms our belief that your company, to meet its opportunities and obligations, not only must continue its effort to expand its reserves of oil and gas in this hemisphere, but must also encourage its Eastern Hemisphere affiliates to strive to augment their already immense reserves.

R. G. Follis, chairman of the board, Standard Oil Co. of California, in a report to stockholders.

He Liked What He Read

Dear Sir:

Your story of Mr. O. A. (Jack) Knight and O.W.I.U. in the November 1 issue of the Journal is certainly interesting and informative. It is the whole picture that is always presented by impartial, able staff members that makes The Oil and Gas Journal my favorite oil publication . . .

H. M. Frye
Largo Oil & Transport Co., Ltd.
Aruba, Netherlands West Indies.

Why Russia Is Selling Cheap

"Oklahoma, which depends to such an extent on oil for income and tax revenues, will have more than a passing interest in Russia's recent contributions to the world-wide petroleum glut.

"Communist oil exports this year are expected to be 10 times as large as they were 2 years ago if all present commitments are discharged. Russian competition is squeezing free world oil exports out of Finland and Iceland and it is making inroads on the markets in France, Western Germany, Belgium, Greece, Italy, Norway, Sweden, Switzerland, Israel, and Egypt.

"What interests western observers

The New Acidizing Inhibitor

Trade Mark

RODINE

Reg. U.S. Pat. Off.

No. 203

Provides Positive Protection

for

Well Tubing – Acid Storage Equipment at high as well as low temperatures. Designed specifically for acidizing.

An organic inhibitor, "RODINE" No. 203 does not contain sulphur or arsenic; ingredients known to stimulate embrittlement.

- Not destroyed by H_2S.
- Does not cause localized pitting.
- Readily soluble in water or acid.
- Needs no dispersing agent.

ECONOMICAL
EFFECTIVE
EASY TO USE

Further Details on Request

Pioneering Research and Development Since 1914

AMERICAN CHEMICAL PAINT COMPANY

CHEMICALS ACP PROCESSES

General Offices: Ambler, Penna.

CHEMICALS ACP PROCESSES

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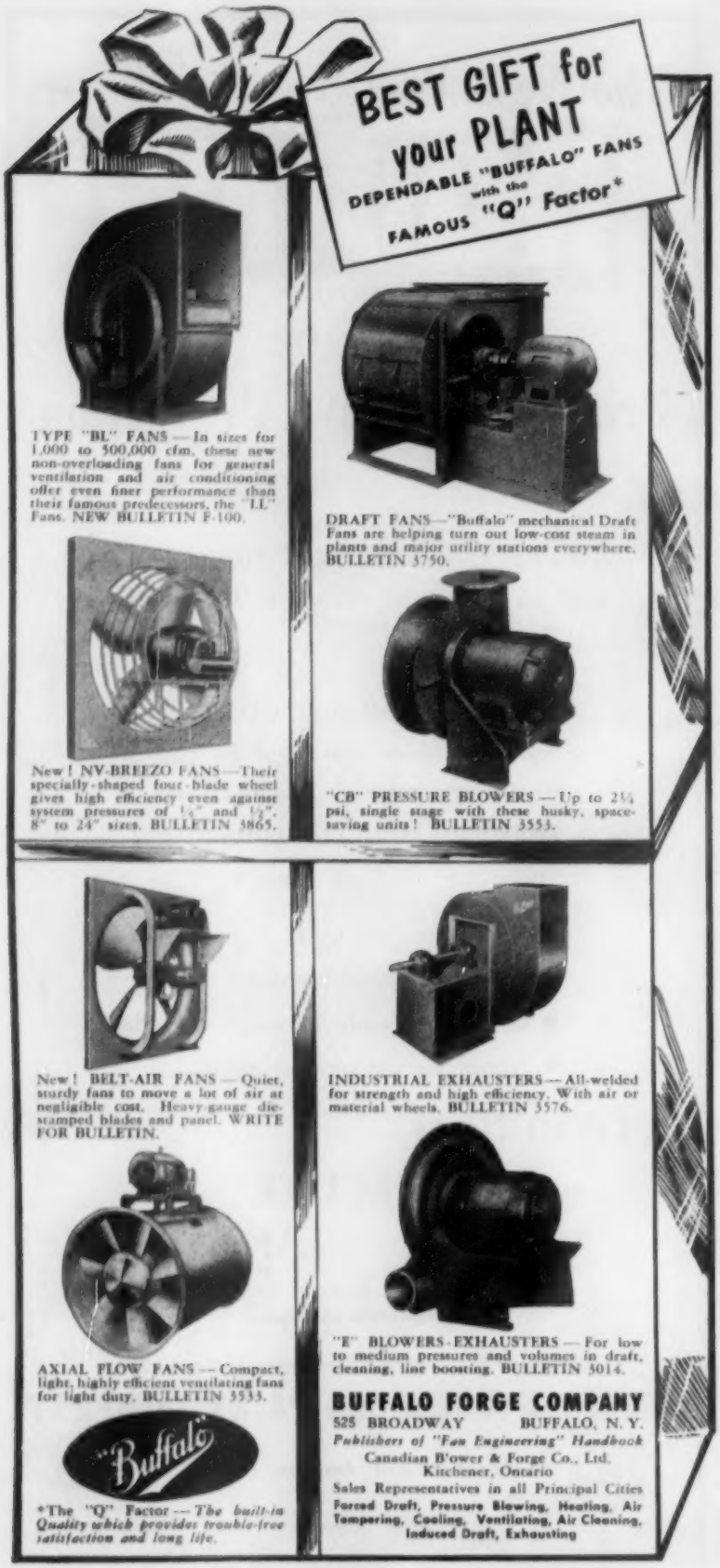

BEST GIFT for your PLANT
DEPENDABLE "BUFFALO" FANS with the FAMOUS "Q" Factor*
TYPE "BL" FANS — In sizes for 1,000 to 500,000 cfm, these new non-overloading fans for general ventilation and air conditioning offer even finer performance than their famous predecessors, the "LL" Fans. NEW BULLETIN F-100.
DRAFT FANS—"Buffalo" mechanical Draft Fans are helping turn out low-cost steam in plants and major utility stations everywhere. BULLETIN 3750.
New! NV-BREEZO FANS—Their specially-shaped four-blade wheel gives high efficiency even against system pressures of ½" and ½". 8" to 24" sizes. BULLETIN 3865.
"CB" PRESSURE BLOWERS — Up to 2½ psi, single stage with these husky, space-saving units! BULLETIN 3553.
New! BELT-AIR FANS — Quiet, sturdy fans to move a lot of air at negligible cost. Heavy-gauge die-stamped blades and panel. WRITE FOR BULLETIN.
INDUSTRIAL EXHAUSTERS — All-welded for strength and high efficiency. With air or material wheels. BULLETIN 3576.
AXIAL FLOW FANS — Compact, light, highly efficient ventilating fans for light duty. BULLETIN 3535.
"E" BLOWERS-EXHAUSTERS — For low to medium pressures and volumes in draft, cleaning, line boosting. BULLETIN 3014.
Buffalo
*The "Q" Factor — The built-in Quality which provides trouble-free satisfaction and long life.
BUFFALO FORGE COMPANY
525 BROADWAY BUFFALO, N. Y.
Publishers of "Fan Engineering" Handbook
Canadian B'ower & Forge Co., Ltd. Kitchener, Ontario
Sales Representatives in all Principal Cities
Forced Draft, Pressure Blowing, Heating, Air Tempering, Cooling, Ventilating, Air Cleaning, Induced Draft, Exhausting

particularly is the fact that price doesn't seem to be an important consideration to the Russians. They are undercutting western oil exporters on price and their quality is good.

"This would suggest that Russia may have political motivations in dumping oil on a saturated market . . . Much of the Kremlin's over-all strategy is based on the expectation of an eventual depression in the west . . ."

Editorial in the Oklahoma City Daily Oklahoman.

More Like Trans-Canada?

"This development (in Alberta) must continue if we are to meet the additional demands for gas supplies which we know will be made in future years.

"It is true enough new reserves are being established in Alberta every 3 years to provide for another big pipeline, but once additional markets are developed, the need will increase just as fast. New supplies must be established on a continuing basis and the only way to assure this is to pay the producers enough for their gas to encourage vigorous development . . ."

N. E. Tanner, president, Trans-Canada Pipe Lines, Ltd., in an address before the Canadian Club, Toronto.

How to Handle Imports

"Because of excessive imports, our petroleum-conservation programs are being crippled . . . Operations of state and local governments are being jeopardized through loss of taxes. Domestic-oil production is today 'shut in' to the extent of more than 1,750,000 bbl. daily, a great portion of this in Texas. These are signs of creeping paralysis which, unless corrected, will permanently retard the search for and development of defense-oil supplies within the United States.

"Domestic-oil producers have exercised extreme patience in their efforts to solve the import problem. Despite these efforts, imports and their harmful effects have continued to increase, rather than diminish.

"The import problem has now become one of basic public policy . . . Failure of all suggested solutions, short of legislation, has removed it from the hands of industry. It is now clearly a public problem involving two alternatives:

"1. Shall we have reasonable imports and maintain a vigorous domestic oil-producing industry capable of defending our nation in any emergency?

"2. Or, shall we continue the present program of inviting increasing dependency on vulnerable foreign-oil supplies, including those of the Middle East bordering on the Russian orbit?

"We believe thoughtful consideration

Something new in diesel fuel

The way things were going, there had to be something new in diesel fuels!

As you probably know, demand for diesel fuels has increased sixfold since 1941 and was threatening to outrun available supplies of middle distillates of the desired ignition quality.

So Ethyl went to work.

Out of our long experience in the field of fuel additives, we were able to come up with an answer. It is a new additive called "Ethyl" Diesel Ignition Improver, which will upgrade heating oils to diesel fuel quality quickly and economically. It was tested in marine engines, railroad locomotives, and trucks. Everywhere the report was the same: *Cetane numbers gained through the use of "Ethyl" Diesel Ignition Improver are equal to natural cetane numbers.*

(Continued on next page)

Printed in U.S.A.

Something new in diesel fuel

(Continued from preceding page)

As a result, diesel fuels improved with Ethyl's new additive are being successfully used in U. S. Navy ships and submarines, and in diesel engines on the road and on the rails.

Our new additive offers several extra advantages to refiners. First, it is now possible to produce large quantities of specification diesel fuels simply and economically. Second, our new additive will increase the flexibility of refining operations. Third, because it is so simple to mix, it enables refiners to upgrade heating oils to diesel fuel quality, either at the refinery or at bulk terminals. Fourth, it enables refiners to market diesel fuels of more uniform ignition quality.

We like to cite the development of "Ethyl" Diesel Ignition Improver as an example of how we were able to be of service to refiners by anticipating what might have become an industry problem.

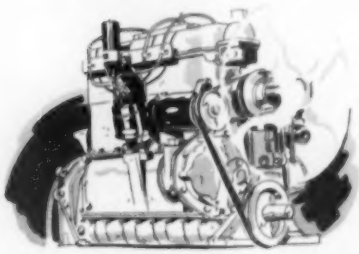
ETHYL CORPORATION

NEW YORK 17, NEW YORK

WORTH NOTING

During 1954, Ethyl's advertisements supporting the oil industry's public-relations program appeared in national magazines reaching more than 31,000,000 readers.

Seventy-five per cent of all work on American railroads is done by 20,000 diesel locomotives—more and more of which each year use fuels improved with "Ethyl" Diesel Ignition Improver.



The experimental XO-121, the world's most efficient tractor engine, developed by the Oliver Corporation, was designed and tested with the assistance of Ethyl technicians.

Ethyl Service is backed by 31 years of antiknock experience

will compel the choice of the first alternative . . ."

Joint statement of W. M. Vaughey, president, Independent Petroleum Association of America; Jack Woodward, president, Texas Independent Producers and Royalty Owners Association; P. W. Pitzer, Jr., president, West Central Texas Oil and Gas Association; D. C. Norwood, president, North Texas Oil and Gas Association; E. J. McCurdey, Jr., president, East Texas Oil Association; and Lawrence Hagy, president, Panhandle Producers and Royalty Owners Association.

Imports Restraint Asked

". . . Too great a quantity of petroleum and its products is being imported from areas with which we do little trading.

"How much of the domestic-oil industry is worth sacrificing for international-political considerations? How much of the domestic industry's ability to produce can be risked before our national defense is permanently injured? . . .

"The record-breaking volume of oil imports violates all rules of equity. Since 1946, oil imports have risen faster, percentagewise, than either domestic production or consumption. The domestic producer, through some of this period, especially this year, has been forced to cut back his production.

"Some specific restraint must be placed on imported oil. It is of paramount importance, in the interests of national security as well as an expanding economy, that a place be maintained for the domestic producer of oil and gas . . ."

W. M. Vaughey, president of the Independent Petroleum Association of America, in an address in Albuquerque before the annual meeting of the New Mexico Oil and Gas Association.

Natural-Gas Economy

"The furnishing of natural gas is not a day-to-day, hand-to-mouth operation. It requires foresight and planning—for tomorrow and for 10 and 20 years from tomorrow . . .

"If the supply of natural gas fails to keep pace with the increasing demand, or if the supply becomes exhausted years before it should, the resultant losses to consumers, residential and industrial, will far exceed any short-term savings which might be realized by artificially depressing the price of natural gas for a short period of time."

W. E. Mueller, president of Colorado Interstate Gas Co., during rate hearings before the Federal Power Commission.

What Do You Need of STEEL!

FLINT can supply you with anything you need in STEEL from steel mesh to the largest processing towers. No order is too large or too small, and deliveries are fast. Whatever you need: GALVANIZED and STRUCTURAL Steel; PLATE Steel; or WAREHOUSE Steel . . . call FLINT.

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division of PETTIBONE MULLIKEN CORP.

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PIN-POINTING TROUBLE BEFORE IT STARTS!

By expanding Antimonial Admiralty Heat Exchanger Tubes over a tapered pin in the laboratory, Chase metallurgists check the ability of the tube to withstand expanding and flaring operations during installation.

Another reason why

Chase®

Antimonial Admiralty Heat Exchanger Tubes last longer!

For heat exchanger tubes that stay on the job year in, year out, insist on Chase Antimonial Admiralty.

What's the secret? *Enough* antimony to resist dezincification effectively. Does antimony adversely affect the strength or other properties of admiralty? Definitely not! The antimony imparts corrosion resistance which assures long life under many different water conditions.

So, whether you're replacing heat exchanger tubes, or planning a new installation, specify Chase Antimonial Admiralty!

CHASE WAREHOUSE STOCKS: New Orleans, Los Angeles. Also carried by Vinson Supply Co., Tulsa; Standard Brass & Mfg. Co., Houston.

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Boston	Detroit	Milwaukee	Pittsburgh	Waterbury
Chicago	Grand Rapids†	Minneapolis	Providence	(†sales office only)
Cincinnati	Houston	Newark	Rochester†	

CALENDAR

DECEMBER

12-15 American Institute of Chemical Engineers, annual meeting, Statler Hotel, New York.

30 Industrial Science Secton, American Association for Advancement of Science, annual all-day meeting, Hotel Claremont, Berkeley, Calif.

1955

JANUARY

10-14 Society of Automotive Engineers, golden anniversary annual meeting, Sheraton-Cadillac and Statler hotels, Detroit.

17-18 Kansas Oil Men's Association, annual convention, Baker Hotel, Hutchinson, Kans.

17-19 Pipe Line Contractors Association, annual convention, Hotel Statler, Los Angeles.

26-28 Symposium on instrumentation for process industries, A. & M. College of Texas, College Station, Tex.

27-28 American Chemical Society, symposium on hydrocarbon chemistry, Rice Hotel, Houston.

27-28 Southern California Meter Association, fourth annual instrument short course, Los Angeles Harbor Junior College, Wilmington, Calif.

FEBRUARY

13-17 American Institute of Mining and Metallurgical Engineers, annual meeting, Conrad Hilton Hotel, Chicago.

13-18 A.S.T.M. Committee D-2 on Petroleum Products and Lubricants, Rice Hotel, Houston.

14-16 Rocky Mountain section of A.A.P.G., annual regional convention, Billings, Mont.

16-18 National Association of Corrosion Engineers, sixth annual short course for pipeliners, Mayo Hotel, Tulsa.

25 National Gasoline Association of America, Permian basin regional meeting, Scharbauer Hotel, Midland, Tex.

MARCH

4 Southern Gas Association, transmission management conference, Shamrock Hotel, Houston.

7-11 National Association of Corrosion Engineers, Palmer House, Chicago.

9-11 American Petroleum Institute, Division of Production, Southwestern spring meeting, Jung Hotel, New Orleans.

17-18 Southern Gas Association, Distribution Management Conference, Jung Hotel, New Orleans.

20-23 American Institute of Chemical Engineers, Kentucky Hotel, Louisville.

23-24 Pacific Coast Gas Association, accident prevention conference, Santa Barbara, Calif.

23-25 American Petroleum Institute, Division of Production, Mid-Continent District, Herring Hotel, Amarillo, Tex.

24-25 American Gas Association, gas supply, transmission, and storage conference, Wm. Penn Hotel, Pittsburgh.

27-29 Texas Independent Producers and Royalty Owners Association, ninth annual meeting, Hotel Texas, Fort Worth.

28-31 American Association of Petroleum Geologists, Society of Exploration Geophysicists, and Society of Exploration Paleontologists and Mineralogists, annual meeting, Hotel Statler, New York.

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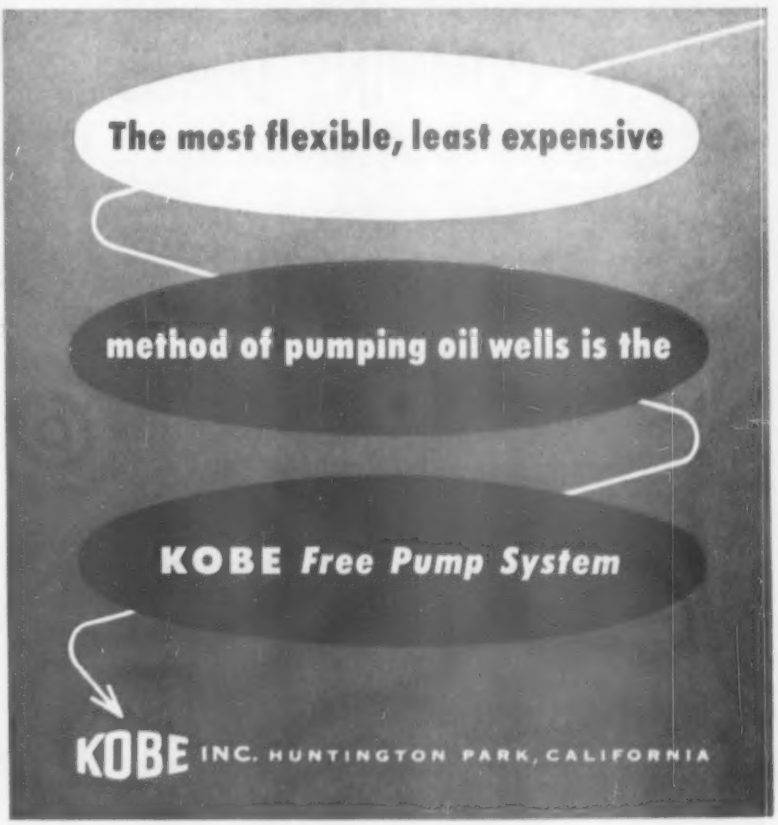
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28-April 1 American Society for Metals, ninth Western Metal Exposition and Congress, Pan-Pacific Auditorium, Los Angeles.

APRIL

7-8 Rocky Mountain District, American Petroleum Institute, Division of Production, Gladstone Hotel, Casper, Wyo.

13-15 Natural Gasoline Association of America, annual convention, Baker and Adolphus hotels, Dallas.

13-15 American Society of Lubrication Engineers, tenth annual meeting, Hotel Sherman, Chicago.

19-20 Pacific Coast Gas Association, distribution conference, Phoenix.

19-21 Southwestern Gas Measurement Short Course, North Campus, University of Oklahoma, Norman, Okla.

28-29 American Petroleum Institute, Division of Production, spring meeting of Pacific Coast district, Statler Hotel, Los Angeles.

MAY

1-4 Liquefied Petroleum Gas Association, annual convention, Conrad Hilton Hotel, Chicago.

1-4 American Institute of Chemical Engineers, Shamrock Hotel, Houston.

9-10 American Gas Association, Gas Supply, Transmission and Storage Conference, Hotel William Penn, Pittsburgh.

9-12 American Petroleum Institute, Division of Refining, midyear meeting, Jefferson Hotel, St. Louis.

11-12 Pacific Coast Gas Association, gas supply and transmission and conference of technical session, Palm Springs, Calif.

12-19 Sixth Latin American Congress of Chemistry, Caracas, Venezuela.

14-22 World Wide Chemical Plant and Equipment Exposition and Congress, Frankfurt Germany.

16-18 American Petroleum Institute, Division of Transportation, products pipeline conference, Edgewater Beach Hotel, Chicago.

16-18 Southern Gas Association, New Orleans.

23-25 American Petroleum Institute, Division of Marketing, midyear meeting, Chase and Park Plaza hotels, St. Louis.

26-27 Kentucky Oil and Gas Association, annual meeting, Lafayette Hotel, Lexington.

MAY 30-June 1 Chemical Institute of Canada, thirty-eighth annual conference and exhibition, Quebec City, Que.

JUNE

5-9 Canadian Gas Association, annual meeting, Sheraton-Brock Hotel, Niagara Falls, Ont.

6-10 American Petroleum Institute, Division of Production, midyear committee conference, Brown Palace Hotel, Denver.

6-15 Fourth World Petroleum Congress, Rome, Italy.

9-10 Natural Gas and Petroleum Association of Canada, Royal Connaught Hotel, Hamilton, Ont.

9-10 Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh.

16-18 Interstate Oil Compact Commission, Denver.

28-July 1 American Society for Testing Materials, Chalfonte-Hadden Hall, Atlantic City, N. J.

SLURRY OIL SQUEEZE

New DOWELL SERVICE is designed to control water production in oil and gas wells

SOS* (Slurry Oil Squeeze) is a new Dowell cementing service designed to stop undesirable water production quickly. It has proven highly effective in both oil and gas wells in almost every type of formation.

The slurry used in SOS consists of portland cement, a special Dowell surface tension reducing agent, and a non-aqueous carrying medium like diesel oil or kerosene. The cement will not set up in the presence of the non-aqueous carrying medium or the crude oil contacted in the pay. It will readily set up when contacted by formation water.

The entire batch of SOS slurry is pre-mixed in truck-mounted, paddle-mixing tanks. This method provides a smooth oil-cement slurry of any density the operator desires. Then high-pressure, triplex pumps are used to inject the slurry into the formation.

Here's proof that SOS pays off! Dowell engineers were called when a well tested several hundred barrels of salt water daily, with only a trace of oil. After SOS, the well produced 40 BOPD and no water. Another well was producing 30 BOPD and 30 BWPD. An SOS treatment stopped all water production. The well still made 30 BOPD.

For full information on Slurry Oil Squeeze call your nearest Dowell office or write DOWELL INCORPORATED, Tulsa 1, Oklahoma, Dept. L-11.

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Performance records prove that Wiggins Double Pontoon Floating Roofs soon pay for themselves in liquid conserved. Only Wiggins Double Pontoon Floating Roofs have every important feature for maximum conservation . . . safest operation . . . low-cost maintenance.

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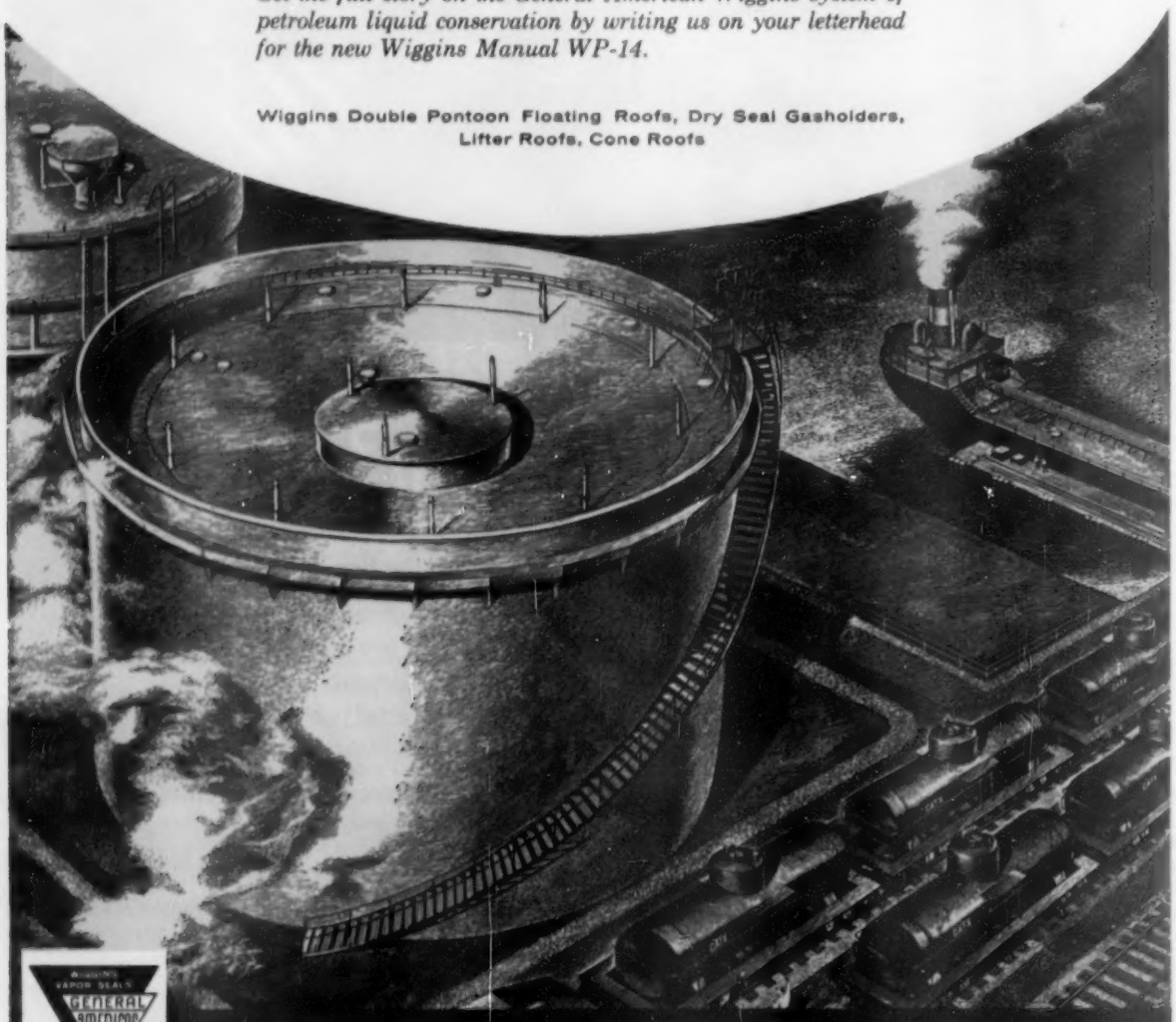

GENERAL AMERICAN TRANSPORTATION CORPORATION

135 SOUTH LA SALLE STREET · CHICAGO 90, ILLINOIS

THE OIL AND GAS
JOURNAL
TULSA, OKLAHOMA

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P. C. Lauinger, President; S. H. Rourke, Executive Vice President; Mitchell Tucker, Vice President and Advertising Manager; Hanson B. Pigman, Circulation Manager; Donald W. Wilson, Manager, Industry Census Department; J. Parker Holland, Production Manager.

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JOURNALLY Speaking

Cover Story

THIS week we're going to lift the cover a little and let you in on some undercover work that's been going on in our shop for many months.

Come January, the Big Yellow Book is going to be re-covered. Advertisers are going to be dis-covered, and our front page will be devoted to what's known in the trade as an editorial cover.

In other words, there won't be any more ads on our front cover. The space will be given over to the editors, and they are supposed to use it to tell what's beyond the cover.

It won't be a table of contents by any means. The idea is to call attention to one or two or three outstanding editorial features in each issue.

Very simple, you say. We thought so too when we first started on the idea, nearly a year ago. But then our cover story began to get complicated. Every editor on the staff had a different idea of what the cover ought to look like. Editors are full of ideas, you know, and no self-respecting editor will admit that anyone else's idea is any good. Result: Some very lively staff meetings but no agreement whatsoever.

The Cover-up Boys

SO the chore was turned over to a small select group officially known as the cover committee, though the rest of us called it the cover-up committee because it worked in such secrecy.

After doing a lot of undercover work we learn that the committee has been making a "dry run" on every issue for months, working up a complete cover just for practice. When the word got around, every free-lance artist in town wanted to sell us a $1,000 oil painting, but the committee quickly ruled against "arty" covers. Attractive they should be, but primarily functional. So don't expect any cover girls.

Now, with the first editorial cover due to be uncovered to a, we hope, expectant public in just 3 weeks, we can tell you this much about them: They won't follow any set pattern.

Occasionally there may be a painting, more often a drawing, photograph, chart, or sketch—sometimes maybe only headline type. This will permit each cover to be adapted to the subject at hand, give free rein to originality, add the charm of variety—and let each member of the committee have his own way now and then.

Anyway, it won't be monotonous.

Extended Coverage

THERE was quite a cover charge involved in this new meal we're cooking up for you, but we always prided ourselves on spreading a good cover so we're going all out. As you can imagine, advertisers paid a pretty penny to get on the front of the world's largest magazine. Take that away and add the weekly cost of designing, engraving, and printing an editorial cover and you can see it runs into dough.

But we reasoned this way: If a front cover is worth several hundred bucks to an advertiser, it ought to be worth at least as much to us. It's our show window, our facade, our main entrance, so why not use it as such? Make it work for the whole book by serving the readers (and therefore all advertisers) better.

So our new cover is designed to advertise us, not others. It's to call attention to one or two of the more outstanding editorial features each issue, flagging them for the attention of our always-busy readers. We'll be using our show window in various ways, but always with the purpose of helping the readers.

Time was when most all magazines had ads on the front, but the modern thing is editorial covers. We're glad to be in step with the present cover age.

There's an old saying that you can't judge a book by its cover. Maybe so, but a cover can give some idea of what's in the book and at least invite a peek inside.

Guess that about covers it. We're going to run for cover.

—*Henry D. Ralph.*

does *Your* Motor Fuel's Mileage Fluctuate with the Temperature?

then "RETAINED VOLATILITY" *is the answer!*

Blending with Warren NATURAL GASOLINE will give it the RETAINED VOLATILITY so necessary for superior performance after it reaches the fuel tanks of your customers . . . under all temperature variations.

Warren's production, transportation and storage facilities are your assurance of the quality and quantity of NATURAL GASOLINE you need . . . when and where you want it.

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Help the Compact help industry more

THE 20-year-old Interstate Oil Compact, one of the many unique features of the oil and gas industry, will soon be up for renewal by Congress.

There seems little doubt, as of now, that Congress will extend the Compact and that the industry will endorse continued operations of the Compact Commission.

But the Compact needs more than endorsement from the industry. It needs its more active assistance, wider participation, and guidance toward new programs of promoting the conservation and regulation of oil and gas at the state level.

The Compact has become such a fixture that few oil operators today fully realize the debts they owe it. The industry's present pattern of operations, which is now taken for granted, would be far different had it not been for this organization.

MUCH MORE CAN BE ACCOMPLISHED for the entire industry if the Compact Commission is not allowed to get into a rut of routine and complacency. Today's problems are not those of 20 years ago, and a reexamination of the Compact's methods and usefulness is needed.

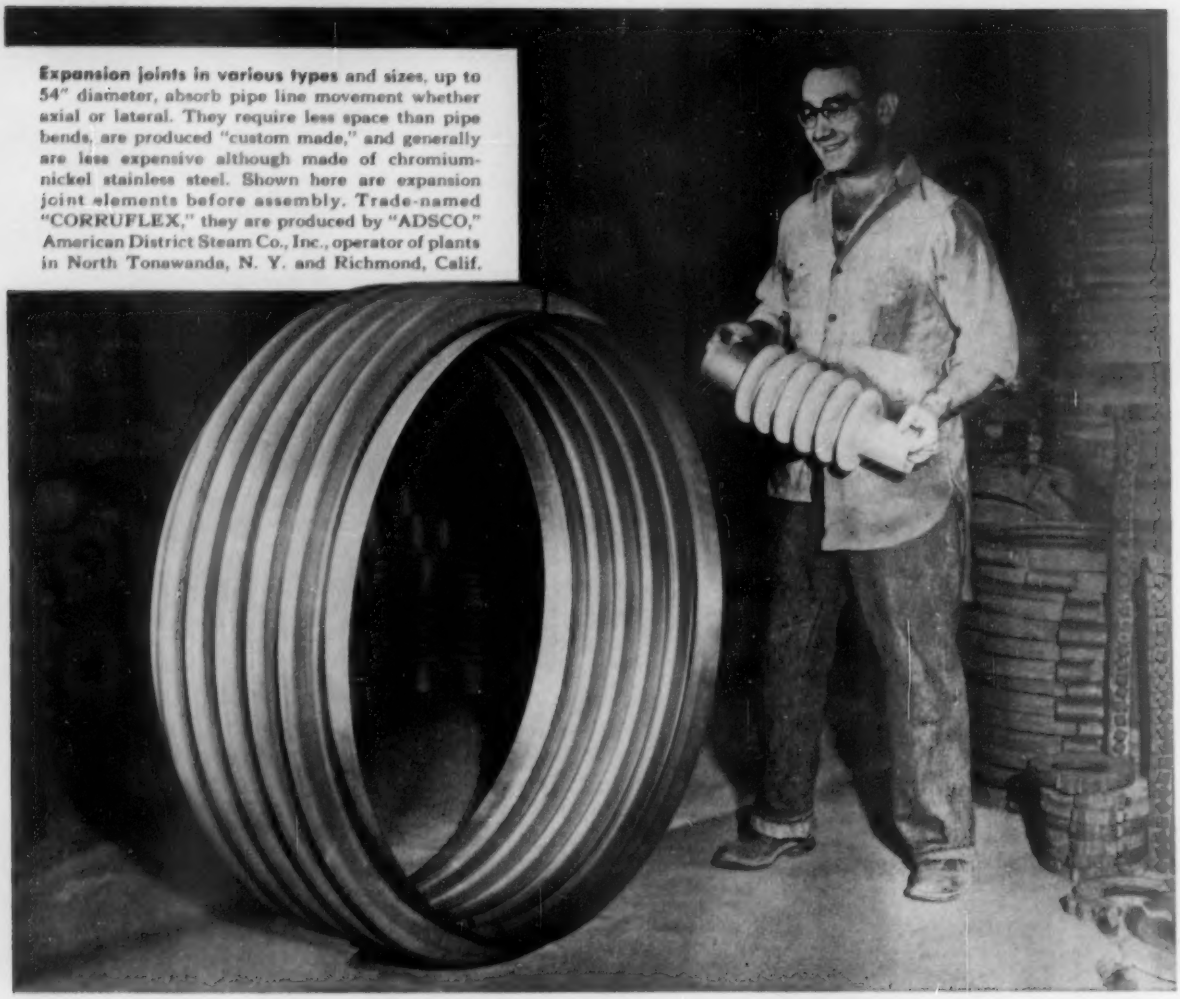
Twenty years ago the oil industry was pulled out of trouble by the forward thinking and bold action of the handful of governors and their associates who formed the Compact. Today the industry can and should supply the leadership and stimulation.

Oil companies could increase the Compact's value by such things as:

- Executive assistance in planning and administration, through participation in meetings or creation of advisory committees.
- Giving more staff assistance to committee work.
- Publicizing the value of state cooperation in conservation.
- Making the commission a real clearing house for legal and technical information on conservation.
- Guiding the Compact toward a more positive program.

OF LATE THE COMPACT HAS SLIPPED into a passive habit of seeking unanimous approval to avoid stepping on any toes. Much more progress—certainly more interest—might be attained by leading the parade instead of following it.

Remembering that the commission is advisory only, and that each sovereign state makes its own decisions, the Compact Commission should be an aggressive missionary for all phases of conservation, and an active advocate of every new legal and engineering idea for greater ultimate recovery of the nation's petroleum resources.



Expansion joints in various types and sizes, up to 54" diameter, absorb pipe line movement whether axial or lateral. They require less space than pipe bends, are produced "custom made," and generally are less expensive although made of chromium-nickel stainless steel. Shown here are expansion joint elements before assembly. Trade-named "CORRUFLEX," they are produced by "ADSCO," American District Steam Co., Inc., operator of plants in North Tonawanda, N. Y. and Richmond, Calif.

expansion joints that get STRONGER with use

INITIAL LOW COST is not the biggest advantage that stainless steel joints offer you . . .

Nor is it the outstanding resistance of chromium-nickel stainless to heat, to erosion and to corrosion . . .

The really great superiority of expansion joints made from Types 304, 316 and 317 stainless steel results from their action where piping movement must be controlled.

These joints minimize stresses and strains on pipe anchors . . . they minimize pressure thrust at anchor points.

The strength of austenitic chromium-nickel stainless steel increases when this metal is cold worked. With proper maintenance, joints of stainless steel containing nickel will last as long as the pipe line.

You can use chromium-nickel stainless steel for all sorts of applications. Not only for strength at temperatures that would destroy ordinary metals, but also for high impact values where temperatures fall as low as -300°F.

In addition, stainless steel containing nickel resists attacks from both organic and inorganic corrosive agents. It's one of the strongest, toughest, and most economical means for extending the life of vapor lines, bubble towers, reactors, and other vital equipment.

Investigate how stainless steel can save you money. Leading steel companies produce austenitic chromium-nickel stainless steel in all commercial forms. A list of sources of supply will be furnished upon your request. Write for it today.

INCO
TRADE MARK

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK 5, N. Y.

THIS WEEK... ...IN THE NEWS

REFINING'S ANSWER to the automotive industry boost in compression ratios—see next page—is found in catalytic reformers like this 12,780-bbl. daily unit built for Cities Service Oil Co. at East Chicago by M. W. Kellogg Co. The nation's motor gasoline will contain about 15 per cent catalytic reformate by the end of this year thanks to a record building program for cat reformers. Watching the boom in reformers, the automotive industry has moved to take advantage of the increase in gasoline potential. The refining industry's cat reforming capacity jumped from 200,000 bb', daily a year ago to the present 600,000 bbl. daily.

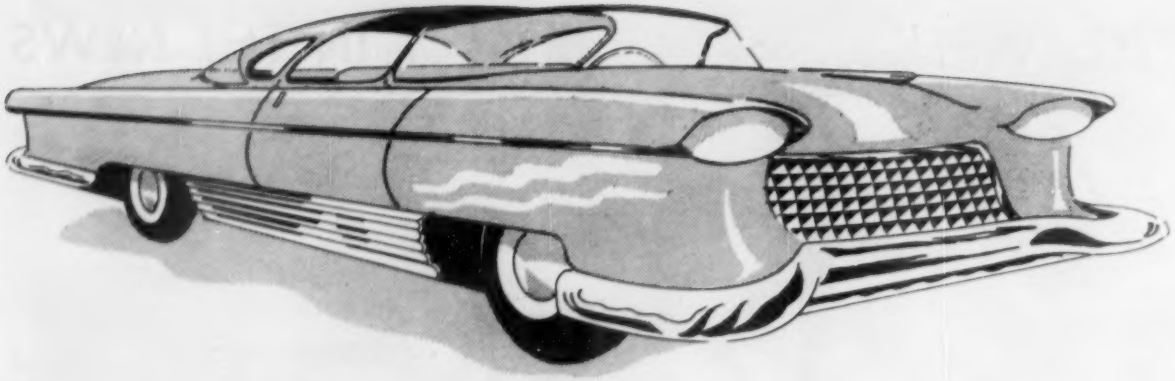
IMPORTS—Foreign oil almost certainly faces some kind of a fight in the next session of Congress. . . . Texas Sen. Price Daniel promises a bill to limit imports of oil unless the present state of things is "considerably" improved by the first of the year. . . . ¶In a fighting speech, new chairman of the Interstate Oil Compact Commission, Gov. William G. Stratton of Illinois, pledges support for a drive for congressional relief from imports. . . . ¶Independent Petroleum Association of America representatives meet this week at Fort Worth with members of five Texas oil and gas associations to map concerted drive against imports. . . .

INTERNATIONAL—Intensive exploration is in store for British Somaliland in East Africa. . . . Standard-Vacuum Oil Co., which has acquired exploration rights on a large area there, is second large American firm to enter the picture. . . . ¶India's refining industry takes another step in long-range expansion expected to enable it to meet 10 per cent of country's petroleum needs. . . . Latest facilities are new lube plant and other units in jungle area of Assam. . . . ¶South Africa puts in operation giant plant converting coal to oil. . . . ¶Government price-fixing threatens completion of refinery in Lebanon. . . .

OFFSHORE—Offshore production soon will be moving through the world's longest submarine pipeline, which runs from Burns Terminal to the Magnolia-Conoco-Newmont block off Louisiana. . . . Crews have completed 35 miles of the 48-mile line. . . . ¶Efficiency of seismic work in the Gulf Coast will probably increase with the use of the zero header, a device that will guide a boat on a straight course and give a continuous bearing on the boat's location. . . . ¶Humble Oil & Refining will take another stab at wildcatting off South Texas coast after $1 million dry hole. . . .

PIPELINES—Federal court may settle controversy between American Louisiana and Panhandle Eastern over gas service in the Detroit area. . . . ¶Conversion of Little Inch to products carrier faces continued opposition from potential competitors. . . . ¶Panhandle Eastern will be able to increase gas deliveries to the Midwest by 100,000,000 cu. ft. daily with completion of first phase of expansion program. . . . ¶New pipeline from Canadian fields is proposed to meet growing crude-oil demand on U. S. Pacific Coast. . . . ¶New Arapahoe crude line gives major new outlet for crude produced in northeastern Colorado and Kansas. . . .

TECHNOLOGY—Electric couplings will transmit the power from engines to mud pumps on Gulf Oil Corp.'s new drilling tender, the Eagle. . . . An innovation in mechanical power transmission, the couplings have no mechanical contact. . . . ¶A new "superintendent" will give the orders at Socony-Vacuum's Paulsboro, N. J., refinery. . . . Process engineers will get their answers on obtaining maximum efficiency from a wide variety of charging stocks from a new electronic digital computer now being installed. . . .



New cars jump compression ratios as . . .

Detroit Puts Pressure on Octanes

- 1955 automotive models set new record increases in power and many need top ratings in both gasoline grades
- Multigrade crankcase oils should become more popular as more severe engine operation calls for better lubes

George Weber

NEW YORK.—Refiners were expecting Detroit to raise the ante on octanes next year, but many may be surprised at the extent of the indicated raise.

It appears that 1955 may see the biggest jump ever in octane demand as the new models build up their initial octane requirement increases.

Detroit's unanimous emphasis on more pep and power is a sign of the times. The coming year will be one of intense competition among the car makers. They have spared no expense in meeting what they believe to be the motorist's desire. In their interpretation, the new car buyer wants power and more power. He wants high engine performance and added creature comforts. He will get them.

The result is an unprecedented rise of about 0.4 of a compression ratio on models thus far announced and a boost of more than thirty in maximum brake horsepower.

But a more significant change has taken place in automotive circles. This change is revealed in the three telling examples.

1. For the first time in history two of the so-called low price class makes, Ford and Chevrolet, have broken the line on recommended grades and now specify premium gasoline for one model in each make.

2. The Chrysler line which has always plugged ability to get along with regular grades is veering away from this angle and is following the trend to higher performance and power with both grades.

3. Economy appears to be a dead issue at least for the present. While it is true that some makers are diverting a little of their added engine efficiency to better mileage, this is a byproduct benefit. Some independents who have been selling economy have changed their tune and will follow the performance and luxury parade.

The American motorist has rather clearly indicated from his buying habits of the past few years that he prefers a low profile to a low gasoline bill. His fuel costs in cents-per-mile appear to have taken second place.

No refiner needs to be told what to expect from this trend in motoring tastes. Octane ratings in both gasoline grades are almost certainly due for further boosts. Both the potential and the incentive will be present during the next year for a continuation of the upward trend.

Octane potential . . . The refining industry seems well prepared to take on any moderate octane boosts. During the past year the lion's share of expenditures in new processing facilities has gone into catalytic reformers and other units which raise gasoline quality but do not expand basic crude capacity.

One year ago, the nation's cat reforming capacity stood at about 200,000 bbl. per day. This jumped to 360,000 bbl. daily by mid-year and will approach 700,000 bbl. daily by the end of this year. The program undertaken in 1954 shows a projected expansion of cat reforming capacity to probably 800,000 bbl. daily by the end of 1955. This alone is estimated to be sufficient to raise motor fuel octanes by three and one half research octane numbers across the board.

Octane incentives . . . For the past year or more, the sustained rise in octane ratings has been attributed more to the keen competition within the oil industry than to any undue pressure from Detroit. Softening of the gasoline market brought about the greatest competitive sales effort ever exerted by oil companies, and octane figures in the selling along with additives.

The automotive industry watched this trend with eager interest. Having made rather substantial boosts in compression ratios in the 1953 models they followed a more cautious line a year ago. Some 1953 cars were designed with such close octane requirement tolerances that they could not be satisfied with the highest available octanes fuels once they had undergone their requirement buildup attending initial engine deposition.

An awareness spread through the automotive industry that the honor of making the car with the highest octane requirement was not an unmixed blessing. Hence the 1954 models introduced a year ago showed moderate increases in compression ratios and did not exert

quite the pressure they did a year previously.

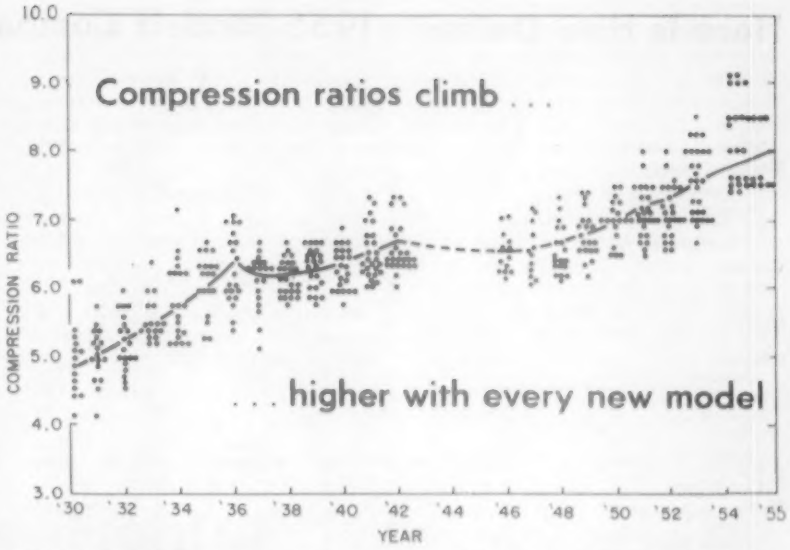
But octanes continued to rise. So car designers have taken up the slack and are once more pushing the limit on many models. This close octane tolerance may not result in the flood of new owner complaints which have badgered sales departments in the past. Car makers, with adequate data on the level of octanes throughout the country are paying more attention to adjusting their cars to operate on available octanes. Instructions are going out to distributors in the relatively lower octane regions, to retard ignition timing and thus prevent trouble.

The level of actual complaints from new car owners may be lower than it has been in the past. But, the pressure is there and will be felt throughout the country. This stepped-up incentive for octane, which rises from Detroit, will be superimposed on the sustained pressure of competition in the oil business, and refiners had best be prepared for many sessions with the sales departments during the coming year.

Power push . . . The extent to which Detroit is taking up the slack in octanes is amply illustrated in the accompanying table. At this date, it is incomplete since not all makers have announced their 1955 models. The Big Three are represented, however, and their tenor is power and more power to make full use of all available octanes over the country.

The figures . . . A few incomplete averages point to the trend. These averages were compiled on only those 13 makes whose 1955 models were announced by last week. On piston displacement, twenty-five 1954 engine models showed an average of 271.4 cu. in. and 29 models averaged 281.6 cu. in. in 1955. On the same basis, compression ratios show an average rise from 7.67 to 8.05 which is the greatest jump in history. The power race is still much in evidence. The arithmetic average of maximum brake horsepower on the twenty-five 1954 models is 154 and the twenty-nine 1955 models of the same make average 186 horsepower.

While few models stepped out sharply in compression ratio last year, there are several new high figures for 1955. The current year's models moved up in average, mainly by bunching closer to the top. The new lines show Buick going to 9.0:1 in three models equipped with automatic transmissions while Cadillac has edged up to 9.1:1. Packard, which led the parade last year with an 8.7:1 model, may again take top spot when the new models are announced next month.



SIZABLE STEP OUT in compression ratios for the 1955 models is shown here. The chart shows the extension of top ratios to 9.1:1 on incomplete returns. The chart, prepared by Du Pont in May 1953, has been updated by plotting the new models introduced so far this year.

Chevrolet's new V-8 with the optional ratio of 8:1 with Powerglide now carries a recommendation for premium fuel. So does the top Ford model, a power package comprising the V-8 with an 8.5:1 ratio and Fordomatic. These are the first instances of premium fuel recommendations for either make.

In the Chrysler line the New Yorker and Imperial carry premium recommendations, and other makes and models in the Chrysler family are pushing the limits on regular octane much closer than last year. Among the General Motors cars, Oldsmobile and Cadillac specify premium fuel across the board. Only the lightest models with standard transmission in Buick and Pontiac are designed to get along with regular grade.

On the high side, it appears from preliminary road tests with clean engines, that Lincoln and Buick may approach critical octane requirements in some cars used in severe stop-and-go type of operation. There is further indication that some models specifying regular grade may be difficult to satisfy when engine deposits have raised their effective compression ratios and octane requirements. Among these might be some Chevrolets, Fords, Dodges and smaller Chryslers. Road-test information available at this early date is not considered necessarily representative of the averages which these new models may later show. They comprise data on a very few cars which may vary from normal, and they further indicate only the clean engine requirements. The octane requirement buildup may differ and alter the position on satisfaction as the car reaches an equilibrium stage where deposits are flaking off at the same rate as they are forming.

Souped up power . . . While last year saw only Cadillac, Chrysler, Lincoln, and Packerd exceeding the 200 level on maximum brake horsepower, this charmed circle will be expanded to include Buick and Oldsmobile for 1955. De Soto and Mercury will be on the threshold with 200 and 198 respectively. Top position at this date is held by the new Cadillac El Dorado which has a rating of 270. Packard, which is building its top level luxury position, has announced that it will not be beat on horsepower. This indicates that the biggest model using a new V-8 engine will top 270, and in doing so, may at the same time exceed the current compression ratio record of 9.1:1. Later next year, the Lincoln Continental will be announced. This super luxury line may set the sights even higher on power output.

Lube requirements . . . The higher severity of engine operation which attends rises in compression ratios and power output will take further advantage of the superior lube oil qualities now available to the motoring public. Car makers are becoming more specific on lube specifications, and some are now not only recommending the service motor severe classification, but are going further to point out that service motor moderate and service motor light are definitely not recommended.

The multigrade crankcase oils should see even greater acceptance since they have a direct bearing on the octane requirement buildup of these more

Here Is How Detroit's 1955 Models Compare With Last Year's

Make and model—	Number of cylinders		Piston displacement, cu. in.		Compression ratio				Maximum brake hp.	
					1954		1955			
	1954	1955	1954	1955	Std.	Opt.	Std.	Opt.	1954	1955
Buick:										
40 Special	8	8	264.0	264.0	7.20	8.10	7.50	8.40	150	188
50 Super	8	8	322.0	322.0	8.00	8.50	8.40	9.00	182	236
60 Century	8	8	322.0	322.0	8.00	8.50	8.40	9.00	200	236
70 Roadmaster	8	8	322.0	322.0	8.50	....	9.00	....	200	236
Cadillac:										
60, 62, 75	8	8	331.0	331.0	8.25	....	9.10	....	230	250
El Dorado	....	8	....	331.0	....	....	9.10	....	....	270
Chevrolet	6	6	235.5	235.5	7.50	....	7.50	....	125	136
	....	8	....	265.0	....	....	8.00	....	....	162
Chrysler:										
Windsor	6	8	264.5	300.5	7.00	....	8.00	....	119	188
New Yorker	8	8	331.1	331.1	7.50	....	8.50	....	195	250
Imperial	8	8	331.1	331.1	7.50	....	8.50	....	235	250
De Soto:										
Powermaster	6	....	250.6	....	7.00	....	....	....	116	....
Fire Dome	8	8	276.1	276.1	7.50	....	7.50	....	170	185
Fire Flight	....	8	....	291.0	....	....	7.50	....	....	200
Dodge:										
Coronet	6	6	230.0	230.0	7.25	....	7.40	....	110	123
Coronet, Royal	8	8	241.3	270.0	7.10	....	7.60	....	140	175
Custom Royal	8	8	241.3	270.0	7.50	....	7.60	....	150	183
Ford	6	6	223.0	223.0	7.20	....	7.50	....	115	120
	8	8	239.0	272.0	7.20	....	7.60	8.50	130	162
Henry J.:										
543	4	....	134.2	....	7.00	....	....	....	68	....
544	6	....	161.0	....	7.00	....	....	....	80	....
Hudson:										
Jet	6	....	202.0	....	7.50	....	....	....	104	....
Wasp	6	....	232.0	....	7.00	....	....	....	126	....
Super Wasp	6	....	262.0	....	7.00	....	....	....	140	....
Hornet	6	....	308.0	....	7.50	....	....	....	160	....
Kaiser:										
Special	6	....	226.2	....	7.30	....	....	....	118	....
Manhattan	6	....	226.2	....	7.30	....	....	....	140	....
Lincoln	8	8	317.0	341.0	8.00	....	8.50	....	205	225
Mercury	8	8	256.0	292.0	7.50	....	7.60	....	161	188
Montclair	....	8	....	292.0	....	....	8.50	....	....	198
Metropolitan	4	....	73.2	....	7.20	....	....	....	42	....
Nash:										
Rambler	6	....	184.0	....	7.25	7.50	....	....	85	....
Rambler	6	....	195.6	....	7.30	7.50	....	....	90	....
Statesman	6	....	195.6	....	8.50	....	....	....	110	....
Ambassador	6	....	252.6	....	7.60	....	....	....	130	....
Oldsmobile:										
88	8	8	324.3	324.3	8.25	....	8.50	....	170	185
Super 88, 98	8	8	324.3	324.3	8.25	....	8.50	....	185	202
Packard:										
Clipper	8	....	288.0	....	7.70	....	....	....	150	....
Clipper De Luxe and Super	8	....	327.0	....	8.00	....	....	....	165	....
Cavalier	8	....	327.0	....	8.00	....	....	....	185	....
Patrician, Pacific, Caribbean	8	....	359.0	....	8.70	....	....	....	212	....
Plymouth:										
P-26	6	6	230.2	230.0	7.25	....	7.40	....	110	117
P-27	....	8	....	241.3	....	....	7.60	....	....	157
P-27-2	....	8	....	259.3	....	....	7.60	....	....	167
Pontiac	6	....	239.2	....	7.70	....	....	....	118	....
	8	8	268.4	287.2	7.70	....	8.00	7.40	127	180
Studebaker:										
Champion	6	6	169.6	185.6	7.50	....	7.50	....	85	101
Commander (Land Cruiser '54)	8	8	232.6	224.3	7.50	....	7.50	....	127	140
President	....	8	....	259.2	....	....	7.50	....	....	175
Willys:										
Lark	6	....	161.0	....	7.60	....	....	....	90	....
Ace, Eagle	6	....	226.2	....	7.30	....	....	....	115	....

critical new cars. They have been recommended for many models and this promotion should increase. Again, the internal competition on lubes has built up quality to a point where there is a substantial cushion on quality for the service MS grades.

Experts in the lube field see no indications of a break in the trend toward longer mileage intervals between crankcase drainings. The demand growth in lubes has lagged behind the trend in vehicles, total vehicle mileage, and gasoline consumption. Dollarwise the effect is less. There appears to be no determined resistance to higher prices for the heavy duty type lubes. This reflects the motorist's reasoning that his car is costing much more in investment per mile than it once did and it is good economy to protect it with the best in lubricants regardless of price, with reservations however.

The marked acceptance of automatic transmissions has built up a major market for automatic transmission fluids. Over a year ago, new cars so equipped passed the 50 per cent point and next year they are expected to predominate even further. No changes appear to be in the offing in automatic transmission fluid specifications. It is still too early to determine whether

higher quality will be required in the next few years as automatic transmission designs improve.

Premium grades are bargains . . . While some manufacturers in both industries may decry what they term the octane race or the power race, it is widely believed that the current developments reflect to the mutual credit of auto and gasoline makers. The new engines coming out of Detroit are considered to be a good compromise. Where possible, compression ratios have been upped in preference to piston displacement for greater power. The added efficiencies of the new engines are going largely to performance and to the operation of automatic transmissions, power steering, power brakes, power seats, power windows, air conditioning and other luxuries dear to the American motorist. Still, Detroit is returning a portion of the new efficiency to the rear wheels in the form of better gasoline mileage. That there is enough additional power left over for this benefit is a telling commentary of the fast pace in improving engine efficiencies.

The swing toward greater recommendations of premium fuel underscores the fact that high-test gasoline is a greater bargain than it ever was. The added increment of power realized from this grade, over and above the output of regular grade, more than offsets the modest price differential at the station pump. The millions of dollars spent in retooling the new models and the even greater investment which refiners are making to meet top octane demands combine to give the American public history's greatest money's worth in fuel and lubricants. The outlook for 1955 adds further to the growing talk of 100 octane premium gasoline which may appear on the scene within a very few years.

INDUSTRY AFFAIRS

I.O.C.C. Elects "Fighter"

. . . Stratton named new compact chairman after delivering speech attacking excessive imports and federal controls

Henry D. Ralph

CHICAGO.—Gov. William G. Stratton of Illinois was elected 1955 chairman of the Interstate Oil Compact Commission after a fighting speech in which he vigorously advocated congressional action to limit oil imports and to free natural-gas producers from all federal regulation.

Representing a predominantly consuming state, Stratton surprised the compact's winter meeting by his unequivocal endorsement of the position of independent producers of oil and gas. He sounded much like the representative of a producing company as he reeled off figures and data concerning the troubles stemming from excessive imports and federal control.

The new chairman pledged his "wholehearted" support of a drive to get congressional relief from the imports problem after declaring that the "tremendous dumping" of foreign oil into the United States market has caused this foreign production to supplant, not supplement domestic production.

"It is apparent that 'business statesmanship,' for many months relied upon by the greater portion of the industry to solve this vital question, has and will entirely fail. Unfortunately this is not a matter that can be handled at the state level. If it were, in my opinion, it would long ago have been solved.

"It would seem that congressional action is necessary, and I assure you of my wholehearted interest and support in securing a proper and sufficient solution thereof."

Natural-gas views . . . Stratton pulled no punches in condemning federal control of natural-gas producers and of those who advocate such control.

"Federal bureaucratic control of the oil and gas industry has now driven its entering wedge, and the ultimate results may be complete federal control over the oil and gas industry, even to the entire destruction of reasonable regulation of this industry under state-enacted and enforced conservation statutes.

"This is not in the public interest. It can result only in diminishing supplies and increased prices in the large consuming areas. Advocates of public-utility type of control of this industry are nearsighted and wholly fail to see the long-range results."

Stratton said the Natural Gas Act must be amended "so as to remove any question of jurisdiction" of the Federal Power Commission over the production, gathering, and sale of natural gas destined for interstate commerce.

Improvements recommended . . . Since this was the twentieth anniversary meeting of the commission and because the compact comes up for renewal by Congress during the next session, much of the program was devoted to review of the accomplishments and objectives of state cooperation in oil and gas conservation.

Gov. Johnston Murray of Oklahoma, outgoing chairman, recommended a number of ways for strengthening the commission's work, including:

. . . Bring more producing states into the compact.

. . . Invite more cooperation from South American countries, by translating some of the commission's material into Spanish.

. . . Institute a public-relations program to inform the public of the work of the commission and the problems of conservation.

. . . Sponsor research and undergraduate study into engineering, economic, and political aspects of conservation.

. . . Develop a long-range plan for conservation and take the initiative in promoting it.

Gov. Dan Thornton of Colorado reviewed the compact's history, pointing out how the organization has helped states adopted laws, rules, and regulations for the greatest ultimate recovery, has prevented waste of oil and gas, and how conservation has been encouraged.

The Colorado governor predicted the compact will find "smooth sailing in the right direction" when the issue of extending the compact comes before Congress.

"No one can overlook results, benefits, and accomplishments, and, last but not least, 28 states . . . which have gone through growing pains in this field and are now ready to take advantage of an organization to face the future of the oil and gas industry."

Oil and the atom . . . Parallels in the regulation of petroleum and of atomic energy were drawn in an address by Lt. Gen. Leslie R. Groves (ret.), vice president of Remington Rand, Inc., and formerly in charge of development of the atomic bomb.

He made a strong plea for freedom from federal controls in the development, conservation, and use of both oil and gas and atomic energy.

"It is my own conviction that in our kind of economy there can never be any real conflict between the oil industry and the field of nuclear energy

as sources of power," Groves said. "As long as we can foresee the future, there will never be too much power, and industry will be able to use every source available."

Private industry, with the aid of state governments, can and will achieve conservation and proper use of all natural resources, including nuclear energy, if not hampered by centralized bureaucratic control, Groves declared.

Other officers . . . Other officers elected were Maurice Acers, official representative of Texas, first vice chairman, and John R. Marchi, Montana representative, second vice chairman. Earl Foster was reelected executive secretary. Only two meetings of the commission were scheduled for 1955, one in Denver in June and another in Santa Fe in December.

Shivers, ex-FPC member see . . .

Gas Chaos Without Legislation

CHICAGO.—Congress must either exempt natural-gas producers from the jurisdiction of the Federal Power Commission or it must enact a specific bill for federal control, Gov. Allan Shivers of Texas told the Interstate Oil Compact Commission.

"At present, for regulatory purposes, anarchy exists," he said. "No one knows where federal authority ends or begins. No one knows where FPC jurisdiction stops or starts. The law, as of now, is only what the commission may, at any given moment decide. Such a situation is not in the public interest.

"Once order has replaced chaos, then all the states should insist upon appropriate congressional action to establish a permanent and durable national policy with regard to our energy resources."

A similar view that the present confusion in the gas industry will not be clarified until Congress acts was expressed by Dale E. Doty, a former member of the Federal Power Commission.

Doty explained in detail the various orders and actions of the FPC in regulating gas production and the several court cases now pending, but concluded that the uncertainty will get worse until Congress enacts a new law.

Issue is basic . . . Shivers stated flatly that the Supreme Court decision in the Phillips case has rendered it impossible for the states to administer their respective conservation statutes effectively.

He said the decision may have made a basic change in the American system of government because it places the Government in a position to dominate production and use of the country's energy resources.

"Of even greater importance," Shivers said, "the decision overturns all the precedents of our national experience by removing from the states the right to exercise the police powers reserved to them by the Tenth Amendment."

The Texas governor warned that no further changes in the law would be necessary to bring about the "equivalent" of nationalization of the country's energy resources.

Commenting that the tidelands issue is "pale by comparison" to the basic issue involved, Shivers contended it is not a problem for the industry, but a "problem for the states." He warned that the issue is not natural gas, but "basically . . . our system of government."

Future to be rough . . . Doty told the compact meeting there will be a gradual clarification of some of the present regulatory problems facing the gas industry, "but unless remedial action of a substantial nature is enacted, the months and years ahead are going to be rough ones, not only for the independent producer and gatherer, but also for the entire gas industry and the consuming public as well."

A number of cases involving various aspects of gas regulation have been started before the commission and the courts, Doty said, but it will take a long time to get decisions and judicial views and FPC majorities are always subject to change.

Analyzing action taken to date by FPC, Doty was unable to find any definite pattern or trend which would indicate what the final outcome may be on any of the many points now under consideration.

Pipeline Challenged

American Louisiana permit is attacked in U. S. court

PHILADELPHIA.—A Federal Power Commission order conditionally authorizing construction of American Louisiana Pipe Line Co.'s proposed natural-gas pipeline to the Detroit area was challenged by Panhandle Eastern Pipe Line Co. in the U. S. Court of Appeals here last week.

Panhandle, which has consistently opposed the American Louisiana project on the ground, among others, that it would further an alleged "monopolistic program" in the Detroit area, asked that the order be stayed. In the 30 reasons it cited, Panhandle Eastern charged numerous errors on the part of the commission.

Among other things, Panhandle Eastern said the commission erred in granting the conditional certificate in the absence of proof of a "lawful" gas supply. The company represented that of the six suppliers upon whom American Louisiana depended for gas, two, representing about 27 per cent of the anticipated supply, have withdrawn under escape clauses in their contracts and the other four have not yet filed applications with the FPC, although American Louisiana said they would.

It was also charged that the commission acted in the absence of substantial evidence that American Louisiana's affiliates have an adequate market for the gas it would transport, and failed to recognize that the project allegedly "cannot presently be financed."

Gas Sales Booming

Consumers gain in number, boost income of utilities

NEW YORK.—Revenue from the sale of natural gas to ultimate consumers during the third quarter of 1954 rose 10.5 per cent above the total for the same period last year, according to the American Gas Association.

Sales for the latest 3-month period totaled $410 million compared to $371 million a year earlier.

For the year ended September 30, sales to ultimate consumers amounted to $2,469 million, or 11.8 per cent above the $2,209 million for the preceding 12 months.

On September 30, the natural-gas industry was serving 21.3 million customers as compared to 19.7 million a year earlier.

During the third quarter of 1954, sales of natural gas increased 8.2 per cent to 11,237 million therms. Increase for the 12 months amounted to 7 per cent. Sales of manufactured and mixed gases showed a slight increase during the third quarter of this year, although revenue was down 3.9 per cent.

Total sales of gas to ultimate consumers brought utilities $488 million in the third quarter for a gain of 8 per cent. For the 12 months ended September 30, revenue from sales to ultimate consumers was up 9.5 per cent as compared with the preceding year's total.

Revenue of gas-utility and pipeline companies, including proceeds from gas for resale, amounted to $4,493 million during the year ended September 30 for a gain of 10.3 per cent. Net income for the period was $434 million, up 7.7 per cent.

New Electronic Brain

. . . will tell Socony-Vacuum process engineers how to get maximum efficiency from wide variety of charging stocks

PAULSBORO, N. J.—Process engineers at Socony-Vacuum Oil Co.'s 100,000-bbl. per day refinery here, will soon look to a new electronic brain for orders.

They will be told how to fractionate a given crude, at what end point to cut naphtha feed to the new cat reformer, and how much gas oil to cat crack at what conversion level.

These and many other directions will evolve from a processing program designed to obtain maximum efficiency from a wide variety of charging stocks. The new electronic digital computer dubbed "Mobilac" now being installed at the local Research and Development Laboratories is believed to be the largest and speediest in the oil industry today. It replaces an older computer which has been in use for several years.

The processing program is to be carried out in cooperation with the refinery staff. A mathematical model of the Paulsboro refinery has been constructed at the laboratory, using numbers and formulas to represent processing units. This model comprises about 100 equations expressing mathematically the behavior of the cat cracking, reforming, and other processing and blending units in use at the refinery. These data in the form of punched cards will be fed into the computer and stored in its "memory."

Another set of punch-cards will record data on crudes which are processed at Paulsboro. They will show crude characteristics, available charge stocks, motor gasoline specifications, product commitments and other operating conditions and requirements. As these crudes are received for processing, the data will be fed to Mobilac. It will then come up with the proper directions for obtaining the optimum realization from each crude stock.

The answers will be available in as short a space of time as 15 minutes. Similar results from manual calculators would take 250 to 300 operators performing problems in common arithmetic, algebra, calculus and logic. In one second the new machine can add or subtract 500 ten-digit numbers, multiply 120 and divide 85. Its "memory" can retain 4,000 ten-digit numbers and it can make choices or decisions based on the results of its calculations.

Mobilac will shortly have a twin at the Field Research Laboratories of affiliated Magnolia Petroleum Co. at Dallas. There it will be put to work on exploration and production problems.

"We expect Mobilac to open up many new avenues for petroleum research as well as new possibilities in the company's production, manufacturing and distribution operations," William M. Holaday, director of Socony-Vacuum laboratories, said. It can be used to improve methods for recovering crude and natural gas reserves from underground reservoirs and has potential application in refining process development, catalyst research, reactor design, crude-oil analysis and gasoline blending, he said.

When used in conjunction with a mass spectrometer which identifies molecular structure of hydrocarbons, Mobilac should facilitate more rapid and much more detailed analyses of crudes, lube stocks and waxes than by present analytical tools. This should promote further improvements in lube oil and wax quality.

The computer was manufactured by the ElectroData Corporation of Pasadena, Calif., an affiliate of Consolidated Engineering Corp.

Buffalo Moves Head Office

TULSA.—Buffalo Oil Co., which moved from Tulsa to Dallas in 1938, last week returned its headquarters to Tulsa.

H. P. Taubman, president and founder, said the move will involve the transfer of about 30 officers and employes to Tulsa from the Dallas office. The Tulsa divisional office, established in 1950, will retain its identity within the new headquarters. The company's other offices at Midland, Tex.; Artesia, N. M.; Wewoka, Okla.; Lafayette, La.; and Ashland and Paintsville, Ky., will retain their former status.

Buffalo, founded in 1934, has production averaging 10,000 bbl. daily.

Top executives moving to Tulsa, besides Taubman, include William E. Stiles, director and vice president in charge of secondary recovery; Jim Kackley, treasurer and director; and J. H. Morris, secretary and director.

Fullerton Sale Completed

LOS ANGELES.—Monterey Oil Co. last week completed the $50 million purchase of all the assets of Fullerton Oil & Gas Corp.

Formerly Fullerton Oil Co., the firm has been active in exploration and production for more than 50 years. Fullerton personnel will be absorbed by Monterey and the company's exploration, development and production activities will be continued.

In the purchase, Monterey acquired 5,700 bbl. of crude and 475,000,000 cu. ft. of gas produced daily from 280 net wells on 14,680 net productive acres in California, New Mexico, Oklahoma, Texas, and Wyoming.

Line Completed

Panhandle winds up first part of expansion program

KANSAS CITY.—Panhandle Eastern Pipe Line Co. has completed the first part of an over-all $66,750,000 expansion program.

Racing to beat the arrival of winter, construction crews finished the $22,885,000, 295 miles of 24, 26, and 30-in. pipe laying in a little over 3 months from the time the project received Federal Power Commission authorization.

Highlight of the construction program was an underwater crossing of the Mississippi River with two strings of 24-in. pipe. The crossing was made at Louisiana, Mo., where Panhandle has gone under the Mississippi before. The river at this point is 2,800 ft. across and more than 40 ft. deep in places.

Panhandle will now be able to increase its deliveries to utility distributors in midwestern states by 100,000,000 cu. ft. daily. Hearings on the remaining parts of the expansion will begin before the FPC in Washington next month.

Panhandle presently is equipped to distribute 970,000,000 cu. ft. of gas daily. When the entire expansion program is completed the peak day capacity will be 1,425,000,000 cu. ft.

Steel Use May Drop

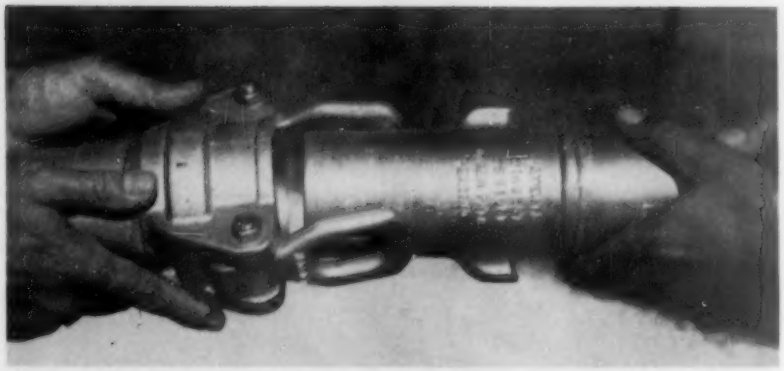
WASHINGTON.—Consumption of steel by the oil and gas industry this year may be a shade under the 5,455,000 net tons shipped to the industry by steel mills in 1953.

Any drop in this year's consumption can be attributed to a slackening off of natural-gas pipeline construction. It dropped from about 9,900 miles in 1953 to an estimated 8,700 miles. A slighter drop, from 8,000 to about 7,500 miles, in oil-pipeline construction contributed to the steel decline.

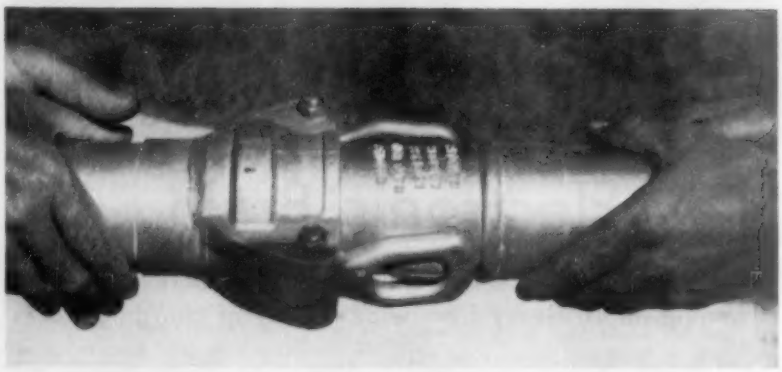
Expanded drilling operations and deeper wells have brought about an increase in requirements for oil country tubular goods.

A review of the situation by the American Iron and Steel Institute last week showed that as a result of pipeline expansion it now takes much more steel to run the oil industry, per barrel of oil or cubic foot of gas, than it did 10 years ago. In 1945 the industry consumed 2,063,000 net tons of steel, or about 40 per cent of what it consumed last year.

Shipments of steel to the oil and gas industry were 164 per cent higher in 1953 than in 1945, the institute said.



A Quick Twist of the Wrist . . .



. . . Fastens New Pipe Coupling

HOUSTON.—A newly developed threadless coupling for temporary oil, gas, and water lines may prove a valuable time-saver to drilling contractors.

The coupling, which can be fastened or unfastened in seconds, is being tested on seamless, extruded aluminum pipe manufactured by Reynolds Metals Co. Field tests indicate a mile of 2⅞-in. aluminum pipe can be laid and picked up in 9 man-hours compared with an estimated 98 man-hours required for an ordinary line of comparable size.

The male end of the coupling has two raised lips on opposite sides. Two links on the coupling socket are clamped over the lips to secure the joint.

A split gasket within the socket seals when the coupling is latched, creating a nonleak union quickly and easily.

The coupling was developed by Race & Race, Winterhaven, Fla., in cooperation with Reynolds engineers.

The 2⅞-in. aluminum pipe used in the tests has an added advantage in that it weighs only about .97 lb. per foot or less than one-third the weight of ordinary pipe. Since a 30-ft. joint weighs less than 30 lb., the pipe can be easily laid and picked up in rough terrain.

Use of the fast-coupling line to drilling locations may save an entire day of rig time, according to Ralph Neuhaus, vice president and general manager of Associated Oil Field Rentals, Houston, distributors of the pipe and conductors of the field tests. In an actual installation, 1 mile of 2⅞-in. pipe was handled by three men and one truck. Stringing and coupling required an average of 1½ hours, and a similar length of time was required in uncoupling and reloading.

Pipe used in the tests has a .038-in. wall thickness with 500-lb. working pressure for oil, water, and gas, and a 1,730-lb. bursting pressure. These specifications permit its use in temporary water and fuel lines, temporary flow lines, and lines for transferring drilling mud between locations.

The pipe also is manufactured in other sizes and specifications, and the new coupling is expected to be available for lines in various sizes. Pipe for temporary lines may be obtained either on a purchase or rental basis.

Heavy Resid Fuels

. . . for gas turbines look better with two new low-cost methods for reducing damaging deposition and corrosion

NEW YORK.—The outlook is brightening for heavy residual oils as gas-turbine fuels.

Two recent methods for low-cost treatment of such fuels have come to light and promise to attract new interest among prospective heavy fuel consumers. One method for modifying No. 6 fuel oil consists of desalting and putting in additives. It was explained in detail in a symposium on gas turbines at the annual meeting of the American Society of Mechanical Engineers here by Bruce O. Buckland and Donald G. Sanders of General Electric Co.

Gas turbine department . . . The case history concerned a method evolved by Central Vermont Public Service Corp. for cleaning up residual fuel fed to three gas-turbine, power-generation units at Rutland. This fuel, brought in to New England by tanker, has a high sodium content due to sea water contamination. Since sodium causes rapid deposit formation and is corrosive to boot, some treatment is necessary at the point of consumption before it can be utilized efficiently.

An economic method was developed cooperatively by Central Vermont and the DeLaval Separator Co. The scheme consists of mixing the oil intimately with water or a water solution of a suitable salt and centrifuging the mixture. The heart of this washing system is a continuously self-cleaning concentrator type of centrifuge.

Raw oil is heated, mixed with an emulsion breaker to improve separation in the sludge tank and centrifuge and is then contacted with the wash solution and passed through two centrifuges in series. The wash solution picks up most of the sodium in the oil and when a solution such as magnesium sulfate is used, a substantial fraction of the unwanted calcium is also removed. A density difference of 2 to 6 per cent is necessary to obtain separation of oil and water solution. In cases where Bunker C oils are as dense as water, use of a solution of a suitable salt will provide the needed differential.

This method has proved successful on a commercial scale, and is being employed to reduce the sodium content of heavy fuel oil to 10 p.p.m. or below. By keeping both sodium and calcium contents down to this level, the utility company found that turbine tests of 50 to 1,500 hours duration showed that deposits were almost eliminated. The steady stage decrease in turbine efficiency resulting from burning these low sodium, low calcium fuels was about 2 per cent and the reduction in regenerator effectiveness about five points.

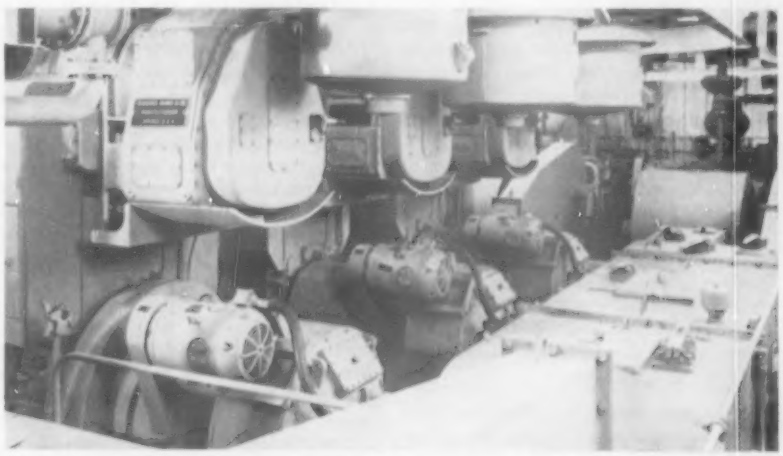
The operators also found magnesium to be a better inhibitor than calcium at temperatures below 1,650° F. since the former does not cause a deposit. The total cost of the fuel treatment including the heat is approximately 14 cents per barrel.

Authors see daylight . . . In the early stages of efforts to adapt residual fuel to gas-turbine use, there was doubt in many minds that a cheap practical method would be found to inhibit ash deposition and corrosion. At least one such solution now appears at hand, Buckland and Sanders said.

They mentioned reports of a second solution to the dual problem of deposits and corrosion, which appears to have been reached by Sulzer Brothers, of Winterthur, Switzerland. This company reports successful use of residual fuel in its gas turbine at Weinfelden where kaolin and metallic additives are blended to the fuel. No details have been released on how they dispersed and emulsified their kaolin, or what metals they used, but they report their treating costs at 12 cents per barrel.

The authors also presented an up-to-date report on the progress in the use of heavy fuels in gas-turbine locomotives. A new kind of fuel is now in use in the 27 turbines operated by Union Pacific Railroad. Not a true residual, it comprises a heavy cycle oil, presumably from a catalytic cracking operatiton. Since it originates from cracking of a distillate feed stock, it is ideally free of sodium and vanadium, containing only one to two parts per million. The authors noted that thus far no deposit or corrosion has occurred from use of this fuel.

It is possible, they concluded, that further developments may reduce the cost of treating residual fuels to the order of 3 to 5 cents per gallon at which level many utilities would become interested in their use. The lessons learned in so treating residuals might also be applied to the burning of petroleum coke, pitch or other heavy products.



Electric couplings transmit power for . . .

. . . Drilling-Tender Mud Pumps

PORT ARANSAS, Tex.—Gulf Oil Corp has put electric couplings to work transmitting power from engines to the mud pumps on its new drilling tender, Eagle, now operating in the Gulf of Mexico.

In an innovation in mechanical-power transmission, the Eagle is using water-cooled, eddy-current electric couplings to transmit power from three engines to a chain-compound drive for its mud pumps. There is no mechanical contact in the couplings.

Especially advantageous in this highly-specialized use, the couplings replace the large friction clutches that would occupy a great deal of space aboard a drilling tender. In addition to the space advantages, the slip characteristics of the couplings make it possible to:

. . . Compound or parallel the output

of two or more of the engines easily.

. . . **Reduce shock loading** on the transmission and thereby reduce maintenance on the prime movers as well as the driven equipment.

. . . **Vary mud-pump speed** while maintaining a constant engine speed. The prime movers cannot be overloaded since the couplings will slip to permit a full stall on the pumps without imposing more than rated output on the engines. An independent cooling system is maintained on each coupling that is capable of dissipating the full horsepower of the driving engine.

Stepless adjustable control of the eddy current by means of the exciting field gives instantaneous response. The excitation current is furnished by an exciter mounted on each coupling and driven by a V-belt from the input shaft.

Controls for the couplings are in an explosionproof cabinet at the driller's position. Individual rheostats for the couplings are arranged so any two or all three can be controlled as a unit. Individual explosionproof, electric tachometers indicate engine and pump speed for each unit.

Flexible power . . . Power flow through the transmission on the tender's mud unit is such that any engine or combination of engines can be assigned to drive an individual pump or group of pumps. The only clutches in the entire transmission are positive, involute-gear, tooth-type clutches on the compounding drives and the pump drives. Air-operated neutral brakes on each countershaft stop rotation to permit rapid clutch engagement.

The compounding transmission is fully enclosed and pressure lubricated and uses precision roller chains. It is actually made up of three individual units tied together to form a single, easily controlled transmission. The three individual units have one main countershaft and one of the units requires a jack shaft because of the location of the driven pump.

Engines and pumps . . . The two main drilling pumps are 7½ by 18 pumps rated for this application at 750 input b.hp. at 60 r.p.m. Each is driven by an 800 b.hp. FM opposed-piston diesel. Only one pump is required for normal drilling but both are operated in parallel during fast upper-hole drilling.

A third and smaller pump rated at 550 b.hp. at 65 r.p.m. is used for normal mud mixing and transfer. It is driven by a 640 b.hp. opposed-piston diesel. Actually, this pump is a satisfactory substitute for one of the main drilling pumps, and is considered good insurance on the Eagle.

All engines are of the "dual-fuel" design in case an early well encounters gas which could be used as fuel.

Industry Briefs

HUTCHINSON, Kans. — Arapahoe Pipe Line last week started fullscale operation of its 568 miles of crude line serving the Denver-Julesburg basin, western Kansas and southwestern Nebraska. Equally owned by Pure Oil Co. and Sinclair Pipe Line Co., the line's first shipment was made a month ago when 25,000 bbl. of crude traveled the 168 miles from Schurr station to Humboldt, Kans.

NEW YORK. — W. T. Stevenson, president of Texas Gas Transmission Corp., Owensboro, Ky., has announced that his firm will ask the Federal Power Commission for authority to increase its pipeline capacity by 111 million cubic feet daily in 1955. Stevenson said that his firm would spend approximately $17.5 million on the construction, but he did not mention how many miles of pipe would be laid in completing the program.

TULSA.—Toklan Production Co. is scheduled to be dissolved and all assets transferred to its parent company, Toklan Royalty Corp. Plans also are being studied to change the parent company's name to Toklan Oil Corp. The transfer includes working interests in 195 wells in Oklahoma, Kansas, Texas, New Mexico, and Illinois. The company also holds royalty interests under 5,705 wells. Daily net production ranges between 1,100 and 1,200 bbl.

SARNIA, Ont.—Imperial Oil, Ltd., has awarded a contract to Curran & Herridge Construction Co., Ltd., Sarnia, to build a new engineering building here. The two-story structure will be 240 ft. long and 65 ft. wide. It will house the company's 150-man engineering staff, which is responsible for design and construction of Imperial refineries in Canada. The building is scheduled for completion next fall.

CANADA

Crude Line Planned

Peace River oil would go to U. S. Pacific Coast

CALGARY.—Increased demand by U. S. Pacific Coast area for Canadian oil has given rise to another application for a crude pipeline in northwestern Alberta.

Six major oil companies active in Sturgeon Lake field have formed Peace River Oil Pipe Line Co., Ltd., to build and operate the line. They are Amerada Petroleum Corp., Gulf Oil Corp., Shell Oil Co., Hudson's Bay Oil Co., Imperial Oil, Ltd., and Union Oil Co.

Peace River has proposed a 16-in. trunk line connecting Sturgeon, South Sturgeon, and Little Smoky fields with a proposed 106-mile, 12-in. line which would move the crude south to Trans Mountain Pipe Line Co.'s Edson, Alta., station.

The 16-in. line would have a 139,000-bbl. capacity. The 12-in. line would handle 58,000 bbl. daily. Officials of the company said that the 16-in. trunk line was being built larger so it could accommodate any future looping of the smaller line.

Economists presently set Pacific Coast demand for Alberta crude at a minimum of 75,000,000 to 80,000,000 bbl. per year.

System to Canada Expanded

PORTLAND, Me.—Capacity of the Portland-Montreal Pipeline System has been expanded almost one-third to 190,000 bbl. daily.

Four new pump stations have been constructed on the 18-in. line. This increases the number of stations on the line to eight. The 12-in. line parallel to the 18-in. line will continue to operate with four stations. Before the expansion, the system's capacity was 158,000 bbl. daily.

The new stations were constructed at Raymond, Me., Gorham, N. H., West Burke, Vt., and St. Cesaire, Que.

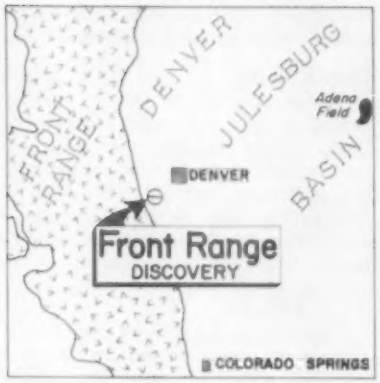
The crude system serves four refineries at Montreal East with oil brought by tanker to South Portland.

The portion of the system located in the United States is owned and operated by Portland Pipe Line Corp., while the Canadian section is owned and operated by Montreal Pipe Line Co., Ltd.

Fracturing Trial Planned

ARKANSAS CITY, Kans. — A 10,000-sq. mile crown lease in eastern New Brunswick is going to get a taste of the fracture treatment that has been successful in areas of the United States.

New Brunswick Oilfields, Ltd., and Orville H. Parker, successful Mid-Continent oil operator, have signed a contract for a development program on the company's lease which calls for a minimum of six wells. Drilling operations will start no later than March 1, 1955 and the last well must be completed within 500 days.



Strike Indicated

Shows reported in well on outskirts of Denver

DENVER. — This Colorado capital city has an indicated discovery at its southwest door in Jefferson County.

S. D. Johnson, T. J. McLarty et al are preparing to test at 1 Pallaoro, 15 miles southwest of Denver's city limits. Oil and gas shows were reported in an unidentified formation that was topped at 8,972 ft.

The prospective strike is located on a fault play that is adjacent to the Front Range of the Rocky Mountains on the western limits of the Denver-Julesburg basin. Previous showings have been reported in the area, particularly at McElroy Ranch 1 City of Englewood.

Line Plans Cancelled

CHEYENNE, Wyo.—Plans for a crude-oil pipeline from the Cheyenne River area of Weston County to Fort Laramie have been cancelled and the line's promotors have switched their sights to a natural-gasoline plant in the area.

Cheyenne Valley Pipeline Co. has withdrawn its application to build the line and the Wyoming Public Service Commission cancelled a hearing on the line scheduled for December 16.

H. O. English, Casper, and Maurice Yates, Salt Lake City, principals in the company, said last week they now have engineers making field studies for a gas-extraction plant in the Cheyenne River area.

Earlier this fall the company announced plans to build a 118-mile, 10-in. line at an estimated cost of $2,280,000. It was planned to move the high-gravity crude produced in the Cheyenne River and adjacent areas of southwestern Weston and northwestern Niobrara counties through Lance Creek to a connection with Platte Pipe Line Co.'s line at Fort Laramie.

Rig Assessments Fixed

BILLINGS, Mont.—Assessors of Montana's oil-producing counties have set the value of drilling rigs at $10 per foot of drilling capacity. Taxes will be based on 30 per cent of assessed valuation.

Two assessment schedules were set for pipelines, pumps, and storage tanks. One determines the taxable value of equipment installed through 1941, and the other applies to equipment put in operation since then.

Other oil-field equipment would be assessed at market value.

Under the assessors' agreement, a rig capable of drilling to 15,000 ft. would be assessed at $150,000. Its taxable valuation would be $45,000.

New Gasoline Plant Ready

SIDNEY, Neb.—Nebraska's largest gas field will be brought into full commercial production when Ohio Oil Co. begins operating its new processing plant in the West Sidney field next week.

Kansas-Nebraska Gas Co. will take the plant's entire 12,000,000 cu. ft. daily output of gas. Frontier Refining Co. is negotiating for the 6,000 gal. of natural gasoline and 13,885 gal. of L.P.G. to be processed by the plant.

The new plant will process gas from 20 wells initially, but eventually will take the output of 6 more.

Gas Line in Operation

BUTTE, Mont.—Montana Power Co. completed and placed in operation last week a 15.5-mile natural-gas line from Belfry to Warren, 60 miles south of Billings.

The line connects the Montana Power system with a Montana-Dakota Utilities Co. line near Warren. Montana Power has contracted to purchase an average of 10 million cu. ft. of gas daily for at least 10 years.

Platte Plans Crude Line

CHEYENNE, Wyo. — Platte Pipe Line Co. proposes to build a $183,000, 8-mile crude-oil pipeline from the Gebo field to Chatham, Wyo.

An application filed with the Wyoming Public Service Commission said the 6-in. line would carry crude production of Continental Oil Co. in Hot Springs County to Platte's main pipeline for transportation to refining centers.

Platte Pipe Line Co. also asked for authority to charge 23 cents a barrel for transporting oil from Gebo to Cheyenne through the proposed line and connecting facilities.

Shell Line Moving Crude

GLENDIVE, Mont.—Shell Oil Co. has begun loading railroad tank cars at Colgate, Mont., with crude delivered by a recently completed 34-mile, 12-in. line from the Cabin Creek and Pine fields.

The pipeline replaces trucks moving the crude to the Northern Pacific railway for shipment to Frannie, Wyo., where it enters the Platte pipeline for delivery to the Shell refinery at Wood River, Ill.

The line was built at a cost of $1,500,000 by Shell Pipeline Corp. with Anderson Brothers Corp., Houston, the contractor. It has an estimated capacity of 27,000 bbl. daily, by gravity flow.

The 12-in. trunk line could "conceivably be a segment of a future pipeline through the Williston Basin," a Shell official has said. No production in the two fields has been shut-in for lack of transportation.

Seven miles of 6-in. laterals were installed in the Pine field and 4½ miles at Cabin Creek.

Husky Buys Clack Stock

CODY, Wyo.—Husky Oil Co. of Cody has completed purchase of the H. Earl Clack Co., of Havre, Mont.

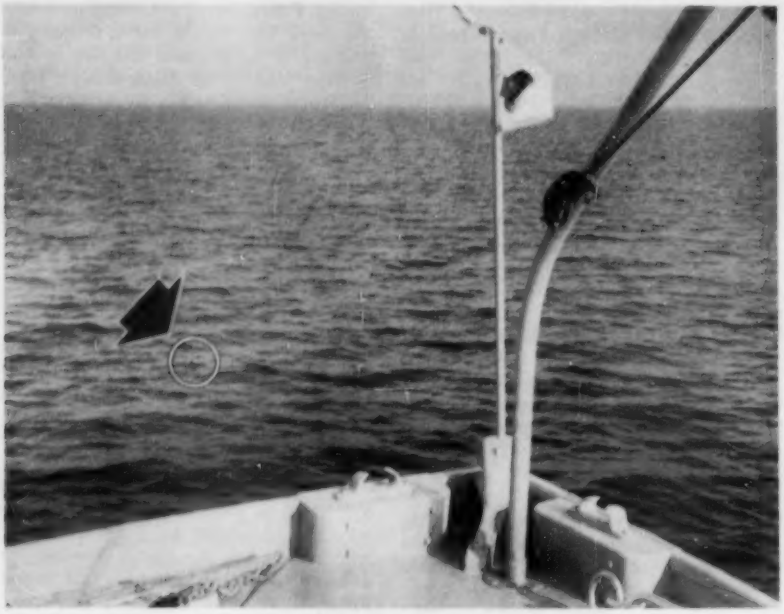
Husky's offer to buy outstanding shares of Clack stock has been accepted by the holders.

Husky acquired an interest in the Yellowstone Pipeline Co. line from Montana to Washington, plus about 200 wholesale and retail petroleum outlets in Montana, North Dakota, Idaho, Washington and Oregon.

North Dakota Spacing Set

BISMARCK, N. D.—The first spacing of oil wells in the Landa and Westhope fields in Bottineau County, north central North Dakota, has been ordered by the State Industrial Commission.

The order, which sets 40-acre spacing in the northeast portions of both fields, will remain in effect until June 1956.



New Offshore Seismic Tool . . .

. . . Spots Cork Miles Away

Carl J. Lawrence

NEW ORLEANS.—Finding a small cork bobbing in the waves miles off the Gulf Coast is as easy as falling off a log for a new device that has been introduced to offshore seismic work.

The new gadget, called the zero header, will not only find the cork for you, but also will tell just how long it will be before you find it.

This latest development in over-water seismic work is used in conjunction with the Lorac radio-navigation system that blankets about 50,000 sq. miles of the Continental Shelf. Pick your spot in this vast area of potential oil-bearing land and the zero header can take you there.

The header was designed by Lorac Service Corp., Tulsa, primarily to help direct seismic ships to shot locations. However, it may develop that the role the header plays in offshore seismic work is one of the minor uses for the versatile gadget. Early experiments show it is particularly adaptable for navigating helicopters.

In a demonstration on Lake Pontchartrain, the zero header met all expectations. It directed a converted PT boat to 11 corks spotted along a triangular, 20½-mile course. The corks, which were about 3 in. in diameter, were not visible until the boat was a few feet from them. As the header directed the boat, the operator called out the location of each cork in relation to the boat.

Lorac representatives say there is no doubt that the zero header will increase the efficiency of offshore seismic work, and the demonstration left no doubt that it will work as long as it is furnished the proper information.

How it works . . . The Lorac system feeds the zero header the information needed to plot a straight course. The Lorac system operates from radio signals beamed from 21 transmitting towers stretching from Mobile, Ala., to Brownsville, Tex. A ship's location is determined by the intersection of two beams. From the Lorac readings, a desired course is preplotted and fed into the zero header.

The course figured by the header appears on a small screen similar to a television screen as a green line parallel to a base line. If the boat veers off course, the green line swings off the parallel, giving an immediate warning. The constant location of the boat is easily figured since the green line diminishes in length as the boat approaches the target location.

The header used in the recent demonstration is the third set manufactured. Two others are being used by seismic crews in the Gulf.

The past . . . The header is one of several strides made in offshore seismic work in recent years.

First navigation in Gulf waters was done with visual tools just as most land surveying is done, but since World War II several wartime developments have been brought into the offshore navigation work.

Radar was introduced in 1946, but had several shortcomings. It was difficult to recognize the proper objects, radar operators often made errors due to fatigue, and the range of radar was limited to lines of sight. Shoran, a navi-

FOLLOWING A STRAIGHT course to a seismic shot is simple with a zero header (right). The preplotted course appears on the header's screen, telling when the ship in on course and how far it is to the target location. Readings from the Lorac receiver (left) supply double check on course.

gational device employing short-wave radio, was introduced about the same time, but it also had a range limitation of line of sight.

As Gulf Coast operators pushed farther into the shelf waters, a wartime development for long-range ship finding was used. This system, called Loran, could give locations within a mile, but was based on timing intermittent radio pulses and was not too effective for the seismic work.

In 1952, Lorac Service introduced its system and since that time has expanded it along 700 miles of the Gulf Coast. It has proved more accurate than its predecessors, and has a range that will reach any of the areas being explored for offshore oil production. The zero header is the last link in this chain of developments.

The future . . . The Lorac-zero header combination has what appears to be a bright future.

For oil work, the company is considering installing a Lorac system in Venezuela. The future of this project rests primarily on whether new concessions are granted in Venezuela. This installation would be the second foreign Lorac system and the third in the world. In addition to the Gulf Coast system, Lorac has an installation off Borneo in the China Sea.

Adapting the combination to helicopter navigation holds the best promise, according to G. H. Westby, Lorac president. He said the combination has been used effectively to guide helicopters, adding that the next refinement will probably be replacing the green line on the zero header screen with a dot that will give a constant location. This would tell a helicopter pilot where he is at all times and enable him to guide his ship on any course.

The company also is talking of installing a Lorac system in the New York harbor area to guide both helicopters and commercial ships. Some preliminary talks have been held with harbor representatives, but nothing definite has been presented. The company also is looking at the possibilities of using Lorac and the header for map making, particularly in some foreign countries.

Leases Cost $64 Million

BATON ROUGE. — Collections by the State Land Office have skyrocketed to all-time records during 1954, with an 11-month total of $64,564,725.37 coming into the state till.

This total has come almost entirely from mineral leases let by the state to private oil firms. Of the total, $37,632,887.16 came from leases awarded on submerged lands.

The 1954 collections dwarf any previous year's total and now top collections for any previous 2 years.

For the 1952-53 biennium, the state office has collected $63,949,499.08, which was the old 24-month record. November's $1,602,265.32 brought the 1954 total to $615,226.29 more than this previous record.

No offshore bonuses were collected during November, but rentals totaling $17,147.44 and royalty payments totaling $335,609.12 boosted the 10-year Louisiana offshore figure to $109,953,356.69. Over a third of this 10-year figure has come to the state during 1954.

Record Offshore Line Almost Finished

EUGENE ISLAND, La.—Construction is moving along at a rapid pace on the world's longest submarine pipeline.

Continental Oil Co. reported here last week that crews laying the 48-mile line are "making good progress" and that the line should be completed by the first of the year unless bad weather intervenes. Crews are working in water from 15 to 25 ft. deep and have laid 35 miles of pipe.

Brown & Root, Inc., Houston, is laying the line for Conoco, Magnolia Petroleum Co., and Newmont Oil Co. The 12-in. line will extend from the Burns Terminal on the coast of St. Mary's Parish, Louisiana, out to the Magnolia-Conoco-Newmont Block 126 in Eugene Island field.

The barnacle bugaboo is one of the major problems faced in laying the line. The electrically welded pipe for the line is being covered with a coal-tar enamel. The barnacles must be "fought off" this enamel coating by 3 in. of reinforced concrete.

The pipe is being coated, wrapped, and cemented in yards at New Orleans. It is barged to the Burns Terminal, and out to Brown & Root's barge.

Each joint is being X-rayed on the barge to insure a perfect weld. Sections are enameled and covered with fiber glass and paper wrapping. Then the 3-in.-thick concrete coating at the joints is applied. Thin strips of tin are fitted tightly around the wet concrete to protest it from the water.

Underwater pipeline construction is a relatively new industry, having started less than 4 years ago, when a short 9-mile line was laid in the Louisiana tidelands. Since then, only about 175 miles of offshore pipe has been laid.

Refinery Planned

Pontiac Eastern to build major Mississippi plant

JACKSON, Miss. — Pontiac Eastern Corp., an affiliate of Pontiac Refining Corp., Corpus Christi, Tex., will build a 12,000 bbl. per day refinery specifically designed to process Mississippi crudes.

The new plant, to be located in South-Central Mississippi, will cost more than $10,000,000. Fluor Corp. is doing engineering designs for the various processing units.

Gov. Hugh White of Mississippi made the disclosure after a recent conference in Pittsburgh with officials of Gulf Refining Co., a major producer in Mississippi. Gov. White said Gulf Refining interested Pontiac in building the plant.

Pontiac Eastern is now studying locations. The company estimates 18 months will be required to build the plant.

No big plants . . . Such a refinery would be the first major installation in Mississippi. Its proposed crude charge capacity of 12,000 bbl. daily would be more than the daily runs of the two existing smaller plants in the state.

Paluxy Asphalt Co. of Sandersville operates a 5,600-bbl. plant which includes 1,600 bbl. per stream day of thermal cracking—all the state has. Southland Co. of Yazoo City has a 5,500 bbl. asphalt plant.

Pipelines . . . Although there are no major refineries in the state, numerous crude gathering lines and one big products line cross various areas of South-Central Mississippi.

Gulf Refining Co. has gathering lines of 8, 10, and 14-in. from Mobile, Ala., to Baxterville, and on up to Hattiesburg and Heidelberg.

Interstate Oil Pipeline Co. has a 12-in. line from near Baton Rouge, La., up to Gwinville, and Brookhaven, Miss.; and the big Plantation Pipeline System (Esso Standard Oil Co., Shell Oil Co., and Standard Oil Co. of Kentucky) crosses the lower central part of the state from Louisiana up to near Gwinville and south of Meridian.

Humble to Try Again

HOUSTON.—Humble Oil & Refining Co., which drilled a $1 million dry hole off St. Joseph Island, South Texas coast, has staked another wildcat in the Texas tidelands.

Humble has awarded drilling contract to Kerr-McGee Oil Industries, Inc., Oklahoma City, for 1 State Tract 794, which will be drilled to 12,000 ft. The wildcat is about 3½ miles south of the dry hole, which was taken to 15,000 ft. in State Tract 692. Several sands between 13,740 and 14,934 ft. were tested before the well was abandoned.

The new test is 15 miles northeast of Port Aransas and 3 miles from land.

Sun Oil Co., which brought in Sprint gas field off the South Texas coast earlier this month, has staked a stepout about 1 mile north of the discovery *(The Oil and Gas Journal, December 6, page 94)*.

SOUTHWEST

Decision Under Fire

Texas Railroad Commission order approving gas-oil ratio credit for water injected at Diamond "M" hit by critics

AUSTIN. — A Texas Railroad Commission decision approving gas-oil ratio credit for water injected into the Canyon Lime pay of Diamond "M" field of Scurry County, has been severely criticized by the industry.

The controversial proposal was made by Lion Oil Co., operator of the Diamond "M" unit, and approved recently by the commission. It provides that injected water may be credited to a well producing at a gas-oil ratio of more than 2,000:1 after converting the volume of water injected to a gas equivalent in terms of reservoir space.

Critics of the action voice two principal arguments:

. . . A precedent might be set which could be employed in other fields to defeat the conservation purposes of gas-oil ratio penalties.

. . . Correlative rights in Diamond "M" and other fields might be disturbed by substituting injected water for produced gaseous hydrocarbons.

The commission admits privately it is treading on dangerous ground and that an adopted policy of this nature conceivably could be abused and abused badly. It maintains, however, that it has not affirmed a new policy and definitely has not established a precedent in approving the Lion application.

The commission regards the Diamond "M" project in the light of a test case and will watch this project to see if substituting water for gas can accomplish anything in the way of conservation. Diamond "M" is ideally suited for such an experiment because for one thing it is entirely unitized.

Humble opposition . . . Most current arguments against the Diamond "M" rule amendment duplicate those advanced by Humble Oil & Refining Co. engineers in opposing the Lion application at the hearing early in October. Humble at this hearing contended that the rule amendment might set a precedent which would render gas-oil ratio penalties worthless and endanger correlative rights.

The company argued that the operation of the rule in water-drive fields having a gas cap would cause waste due to gas-cap shrinkage and loss of oil as a result of migration into the gas cap.

Injected water, it said, would not have the same continuing effect on pressure as an equivalent volume of gas because of its negligible expansibility. Therefore, a lower reservoir pressure would result in the absence of 100 per cent displacement of reservoir voidage.

Also in many reservoirs, a part of the water injected is dissipated outward and does not exert full effect toward displacement of oil as does gas returned to the gas cap, Humble said.

If the reservoir pressure is maintained by water injection in Diamond "M", Humble said, high-ratio producing conditions other than those created by the previously injected gas should be eliminated, thus removing the necessity for asking relief from gas-oil ratio penalties. Humble argued further that the proposed rule would circumvent gas-oil ratio penalties while replacing only about 10 per cent of reservoir voidage.

Substitute remedy . . . Humble admitted that Diamond "M" in the past has absorbed more injected gas than required to conduct operations on a 2,000:1 penalty basis.

The firm suggested, however, that in place of the Lion Oil proposal a gas bank be recognized by the commission equivalent to the amount of gas injected in excess of that applied for removal of gas-oil ratio penalties.

The gas-bank net ratio credit would remain in effect only until the gas bank were dissipated.

Water injection stepup . . . The Diamond "M" pressure-maintenance project, involving injection of both gas and water was approved by the commission in November 1951. The unit takes in about 4,500 acres and more than 100 wells.

Bottom-hole pressure in the field, ac-

cording to testimony at the hearing by W. A. Vestal, district engineer for Lion, has been essentially maintained for the last 16 months at around 1,400 psi. due to the pressure-maintenance operation, but gas-oil ratios (now about 2,340:1) are still climbing.

Gas is being injected into the Canyon Reef at a rate of about 6,000,000 cu. ft. daily under 1,400-1,600 psi. pressure. Cumulative injected gas totaled almost 4.2 billion cubic feet last month.

Efficiency of the gas sweep was figured at about 50 per cent at the start of injection but now has tailed off to about 20 per cent, Vestal said. This efficiency decrease has led Lion to plan to decrease gas injection and step up water input. This has not been feasible beforehand because of a limited supply of water and insufficient injection wells.

Vestal said plenty of water now is available from the new Lake Thomas, and additional input wells have been selected along the unit boundary.

Water injection, he said, will be increased to 16,000 bbl. daily by January 1955, and to 30,000 bbl. daily—a full-scale flood—by January 1956.

Lion expects pressure maintenance to about double ultimate oil recovery to 40 per cent of that originally in place. The company expects gas-oil ratios to increase in the unit for another 3 or 4 years before they begin to decline.

Import Ban Promised

Daniel plans bill to curb imports unless situation is improved "by January"

FORT WORTH.—Texas Sen. Price Daniel last week said he will introduce legislation to limit oil imports at the next session of Congress "unless the situation is considerably improved by January."

Daniel said excessive oil imports constitute a problem of real concern to Texas and that a solution which would properly balance total imports with United States oil demand is long overdue.

He added that he is trying to rearrange his schedule so that he might attend this week's joint imports policy meeting here of the Independent Petroleum Association of America and five Texas oil and gas associations.

Daniel said that he was encouraged that Texas producers are meeting to arrive at a composite stand on the import question and that he would welcome any constructive suggestions which might come out of the session.

Pollution Controls Urged

Proposed legislation would require Texas oil operators to post bond with Railroad Commission before drilling

AUSTIN.—The Texas Water Resources Committee has proposed legislation giving the Texas Railroad Commission additional powers to prevent pollution of surface or underground waters by oil operations.

The proposed law would order the commission to set up and enforce anti-pollution precautions in the drilling of all wells including stratigraphic tests, in the production of these wells, and in plugging and abandoning them.

Pollution is defined as any contamination of surface or subsurface fresh waters by crude oil, salt water, or other mineralized waters.

The bill would require an operator to file a $5,000 bond with the Texas Railroad Commission for each well he intends to drill, or a $10,000 bond for all wells to be drilled, prior to spudding. The bond also would be required of an operator who acquired a well not previously plugged. The bonds would be retained by the commission until the wells were properly plugged as determined by the commission.

World field problem . . . The new regulations would considerably broaden powers granted the commission by a 1936 legislative act and would be in the form of an amendment to that act.

The move to strengthen pollution-control measures follows a series of hearings by the Railroad Commission regarding alleged fresh-water pollution resulting from oil operations in World field of Crockett County, West Texas.

In this case, the state Board of Water Engineers, municipal authorities, and area land owners joined in a complaint that oil operators were improperly disposing of the considerable volume of salt water produced with oil in the field.

Complainants testified that numerous fresh-water wells within 10 to 15 miles of the field became salty within the past year. They held that this was due to irregular disposal measures, including use of inadequate evaporation pits, dynamiting of these pits in some cases, and syphoning of salt water from a pit onto the surface soil. They asked that the operators be required to return salt water to a salt-water sand.

Ivan Stout, chief engineer for the Board of Water Engineers, testified that evaporation pits in use in the area could not possibly handle the volume of water produced from the field. He maintained that such an operation would require more than 1,700 acres in pits.

Operators contended World field operations are not causing pollution of the fresh-water sands. The salt-water contaminating these sands, they argued, is coming from underground sources—probably the San Andres brine formation.

Analyses of samples of water taken from various contaminated wells, they said, showed that the degree of pollution increased with distance from the field and that no pollution existed in any area near the field.

World field operators represented at the most recent hearing which ended December 3 were Tennessee Production Co., Amerada Petroleum Corp., Standard Oil Co. of Texas, LFT Operating Account et al, and Garrett M. Smith.

Some legal observers of this dispute question whether the Railroad Commission presently has the authority to take any action in the World field dispute even if it decides that oil operators have been negligent. It is such situations which the Water Resources Committee hopes to avoid with its proposed legislation.

Texas Leases Big Blocks

AUSTIN.—Operators submitted bids totaling $4,760,000 for oil and gas leases on 33,478.14 acres of University of Texas land in West Texas.

Highest bonus accepted by the Board for Lease of University Lands was $1,700,000 paid by Stanolind Oil & Gas Co. for a 2,574-acre block in Andrews County entitled Tract 19. This acreage is 1½ miles north of East Means field. Lease terms call for a 12,500-ft. well to the Devonian formation.

Texaco paid the auction's second highest bonus of $250,000 for a 2,562.8-acre tract half a mile north of Lion pool in Ward County.

Plymouth Oil Co. paid $10,000 for a 1,171.-99-acre parcel near Barnhart pool in Reagan and Crockett counties, while Hanley Co. submitted the successful bid of $8,000 on a 1,979.1-acre tract northwest of Flat Rock field in Upton and Reagan counties. F. W. Holbrook paid $127,000 for a 166.08-acre lease on the south side of Farmer San Andres pool in Crockett County.

Pickton Shift Asked

Humble says Northeast Texas field should revert to statewide proration schedule to avoid decrease in production

AUSTIN.—Pickton field, a large northeastern Texas oil pool with an erratic pressure history, may be returned to the statewide proration schedule for the first time in almost 3½ years.

Pickton has been operating on a producing-day pattern ranging from 6 to 10 days since September 1951. Oddly enough, while producing days for the field would be increased from 9 to a probable statewide figure of 15 to 16 days, allowable production from the field actually would be cut if an application to the Texas Railroad Commission by Humble Oil & Refining Co. is approved.

Humble submitted two reasons for its double recommendation for Pickton. One is that the Bacon lime reservoir has performed favorably under a pressure-maintenance program involving injection of produced and extraneous gas to build up reservoir pressure. The other is that a continuation of the pressure buildup by the so-called overinjection would necessitate reducing oil withdrawals within the next few months.

Pickton currently is allowed to produce from 3,800 to 3,900 bbl. per calendar day. Humble asked that the calendar-day figure be reduced to 3,500 bbl. per day and the field returned to statewide status.

Such an action would mean that the producing-day output of the field actually would be cut in half during a normal 30-day month, from roughly 12,500 bbl. per producing day under the present 9-day schedule to approximately 6,000 bbl. per producing day under a 16-day schedule.

Up and down . . . Reservoir pressure at Pickton when the 7,400-ft. Bacon lime formation was discovered in November 1944 was 3,578 psi. Pressure-maintenance operations in the 7,155-acre, 166-well Hopkins County field were launched in August 1949 with the injection of 15,000,000 cu. ft. of produced and extraneous gas daily. Pressure at that time had fallen to 3,020 psi.

Limits of the field were extended in 1950 when pressure had been built back up to 3,270 psi. Pressure started another rapid decline with development in the extension area. In September 1951, the Railroad Commission cut allowable producing days from 24 to 10. A further cut from 10 days to 6 was approved in May 1952, together with a unitization agreement for the field.

Pressure continued to fall off until September of that year when it stood at its all-time low of 2,570 psi. The operators that month installed additional input facilities bringing injection capacity up to 45,000,000 cu. ft. daily.

Pressure responded rapidly, climbing to 2,919 psi. a year later and to 3,110 psi. by September of this year. Producing days for the field were increased to 9 by the commission in December 1952. Gas-oil ratios continued to climb, however, from 6,582:1 in Septetmber 1952 to 7,051:1 in September 1953, and to 8,820:1 in September of this year.

Reduced injection . . . The volume of gas injected recently has been decreased to about 38,000,000 to 39,000,000 cu. ft. of gas daily. John G. Calvert, Humble petroleum engineer, told the commission that under present operations involving less "over injection," pressure will level off and begin to decline in the next few months.

Flood Permit Asked

Pressure-maintenance plan for Sandusky field sought

AUSTIN.—Operators in Sandusky field in Grayson County are negotiating an agreement on a waterflood, pressure-maintenance project which would counter declining pressure in the Oil Creek pay formation.

The Texas Co., one of the larger firms with interests in the field, last week asked the Texas Railroad Commission to cut the field's producing days to 13 for the first 6 months of 1955 so the water flood can be set up.

If and when the pressure maintenance program is placed in effect, Texaco said, plans call for injecting water below the oil-water contact of the Oil Creek sand at approximately 7,100-70 ft. and shutting in of the high gas-oil ratio wells.

Field data . . . Sandusky field was discovered July 20, 1950 and had produced more than 2,500,000 bbl. of oil as of October 1 of this year. It has 940 productive acres and 32 producing wells—none of them marginal though three are limited capacity producers. Eight wells are making water, which in September was 18.7 per cent of total fluids.

The field produces via expanding solution gas and with a limited water drive. Originally there was no gas cap, but Texaco engineers believe there is a possibility a secondary gas cap may be forming. Initial reservoir pressure of 3,470 psi. was down to 2,579 psi. as of October 1954 while gas-oil ratios averaged 2,045:1 as of September 1954.

Texas Natural Gasoline Corp. is installing two 880-hp. compression units and it is expected these units will process 100 per cent of the gas produced.

"Failure" Produces

Gas and distillate tapped in workover at dry hole

LONGVIEW, Tex.—A workover job on an old well southeast of Longview, Gregg County, 10 miles from shallow Woodbine production in East Texas field, has turned a failure into a fair-sized Pettit limestone discovery.

F. R. Jackson and associates reworked the old Ace Oil Co. and John C. Robbins 1 Grissom, located in the D. Simpson Survey. The well was originally abandoned as a dry hole at 7,209 ft. New work included an electrical survey and acid treatment of a 9-ft. section beginning at 7,143 ft. Following acid treatment, the well kicked off and flowed wet gas estimated at up to 2,000,000 cu. ft. daily, plus 200 bbl. of distillate. The flow was through ¼-in. choke, under pressure of 200 psi. on tubing.

Jackson and associates, including Robbins, hold an 8,000-acre block in the area and plan to drill additional wells. Robbins assembled most of the acreage in 1952 from an aerial survey.

Other companies with acreage in the area include Trahan & Associates, Shreveport, who have approximately 2,000 acres across the Sabine River to the northeast, and Carter-Jones Drilling Co., Kilgore, which holds a block to the east of the discovery.

Rubber-Plants Sale Near?

Government may operate synthetic-production facilities for years unless negotiations completed within 2 weeks

WASHINGTON. — Continuation of government synthetic-rubber production for years to come may be in the cards if the federally owned plants are not sold within the next 4 months.

With only 2 weeks to go before the December 27 deadline on negotiations, the Rubber Producing Facilities Disposal Commission is confident it will come up with a sales program acceptable to the Department of Justice and Congress. But there are still some differences of opinion over prices at which bidders will buy some of the facilities that are up for sale.

The disposal program has three big hurdles to top:

. . . **Sales must involve** properties capable of producing at least 500,000 long tons a year of GR-S and 43,000 tons of butyl rubber.

. . . **The attorney general** must pass on antitrust and competitive aspects of sales negotiated by the commission.

. . . **Congress has 60 legislative** days in which to accept—by not disapproving—enough sales to meet the capacity requirement. The commission is scheduled to submit a completed program on the proposed sales to Congress by January 27.

If the disposal effort fails, the Government will remain in the rubber-producing industry, and members of the commission and Congress believe it will stay there for a long time to come. The present Rubber Act runs until March 31, 1956, and could easily be extended for any period decided upon by Congress.

The outlook . . . If private enterprise fails to take over the synthetic-rubber industry now, commission officials expect conditions for the transfer from government to private operation to be even less favorable in the future.

The possibilities were summed up recently by E. D. Kelly, director of the Office of Synthetic Rubber under the Federal Facilities Corporation, which last year took over operation of the facilities from the Reconstruction Finance Corporation.

If the Rubber Act of 1948 is extended, it will be for a long period of time, Kelly predicted. There would be no competition from private industry as long as the Government remained in business, and there would be a tendency, normal in government enterprises, toward more bureaucratic operation of the rubber program.

If the Government remains in business, its monopoly will become even greater as increasing demand leads to large expenditures for expansion. Government research would continue, but industry interest in developing new and better products would wane.

International effects . . . Continuance of government rubber production also could raise grave international problems arising out of the competition with natural rubber from areas which are being eyed covetously by the Communists. For Malaya, Indonesia, Ceylon, and Thailand, the United States is the market which determines whether they produce at a profit or a loss.

Natural-rubber production this year is expected to be approximately 1,730,000 tons. World consumption of new rubber will be 2,390,000 tons, of which the United States will account for 1,205,000 tons or slightly more than half. With a synthetic-rubber production here of 627,000 tons (the rest of the free world will produce 90,000 tons) the U. S. market for natural rubber will require about 578,000 tons, or one-third of total production.

Preliminary estimates for 1955 indicate an increase of a little more than 4 per cent over this year's consumption both in the United States and in the rest of the world. This country's requirement for new rubber is placed at 1,255,000 tons and that of other countries at 1,235,000 tons, for a total increase of 100,000 tons.

Natutral-rubber production is expected to be about 5,000 tons less than this year, or 1,725,000 tons, leaving a requirement of 765,000 tons of synthetic rubber. The disposal program is aimed at assuring the production of at least two-thirds of this requirement.

Fuel Contracts Awarded

WASHINGTON.—Contracts for 1,651,000 bbl. of motor fuel, 782,000 bbl. of diesel oil, and 19,410,000 gal. of aviation jet fuel were awarded by the Armed Services Petroleum Purchasing Agency last week.

The largest contract went to Atlantic Refining Co., for 780,000 bbl. of 83/91-grade motor fuel for $4,009,824. Other motor-fuel contracts were awarded Republic Oil Refining Co., for 300,000 bbl. of 83/91 grade at $1,593,000; Suntide Refining Co., for 260,000 bbl. of 80/86 grade at $1,019,200; and The Texas Co., for 186,000 bbl. of 83/91 grade for $983,530 and 25,000 bbl. of M grade, regular, for $137,750.

Contracts for diesel oil were split among Sinclair Refining Co., for 360,000 bbl. marine grade at $1,285,200; Taylor Oil and Gas Co., for 372,000 bbl. marine grade for $1,309,440; and The Texas Co., for 50,000 bbl. of Class 3 for $174,090.

Contracts for JP-4 aviation fuel were awarded Armour Oil Co., 10,000,000 gal. for $1,238,000; O. F. Collinge Co., 5,250,000 gal. for $673,050; Standard Oil Co. of California, 1,450,000 gal. for $187,485; and Bell Oil and Gas Co., 2,710,000 gal. for $246,881.

FPC Stymied Again

Court grants third firm relief from Order 174-A

WASHINGTON.—A third court action against enforcement of Order No. 174-A was served on the Federal Power Commission last week.

A temporary injunction enjoining the commission from enforcement of the order was issued by Judge Alexander Holtzoff of the federal District Court here on a petition of the Union Producing Co. The court will hear oral argument December 13 on the FPC's motion to dismiss.

In his order, Judge Holtzoff found that the commission's orders 174 and 174-A were issued "without notice to plaintiff" and that no hearing was held before their issuance. He pointed out also that no action had been taken by FPC on the company's petition for a rehearing.

"For the purposes of this motion for preliminary injunction," the court held, "plaintiff has made a sufficient showing of facts to raise grave and sufficient question whether (a) plaintiff is a 'natural gas company' within the Natural Gas Act and whether (b) Orders 174 and 174-A were properly issued under the Administratitve Procedure Act and the Natural Gas Act."

The U. S. Fifth Circuit Court of Appeals at New Orleans previously intervened by granting temporary relief from the order to Magnolia Petroleum Co. and Ohio Oil Co. *(The Oil and Gas Journal, November 22, page 57).*

Conversion Opposed

FPC hears Texas Eastern's plan for Little Inch line

WASHINGTON.—An upturn in the Little Inch pipeline from a gas to an oil-products carrier was opposed before the Federal Power Commission last week as a threat to Mississippi and Ohio River barge operators and to the proposed American Pipe Line Co. project.

But FPC Examiner Emory J. Woodall said the commission is concerned only with learning whether the substitution of new facilities proposed by Texas Eastern Transmission Co. would give present and potential gas customers better service.

The FPC, Woodall said, has no authority over the construction or operation of oil pipelines and so far as the commission is legally concerned Texas Eastern could drop the line "off a cliff" if given permission to abandon it as a gas carrier.

Objections . . . Counsel for the barge operators and American Pipe Line argued that the commission must consider the effect of the shift of the Little Inch line on other types of oil transportation. Barge operators contended the conversion would be "monopolistic" and intimated that if the FPC approved the application the matter might be taken to the courts.

Clyde Hargrove, counsel for Texas Eastern, said the new system would lower the cost of service to customers and enable the company to tap new sources of gas. He explained that the company proposes to build new gas facilities from southeast Texas through Louisiana to Kosciusko, Miss., if the Little Inch is converted to products.

Aside from the Mississippi - Ohio River barge operators, who for several years have been fighting all proposals for product lines through the area they serve, and the American Pipe Line, which has a certificate for accelerated amortization for a line which is not yet under construction, there was little opposition offered to the Texas Eastern proposal. Representatives of several gas-distributing companies stated they were concerned only with assurances of an adequate and economical supply of gas.

Tanker Charter Rates Increase

WASHINGTON.—An upturn in the tanker charter rates has been noted by the Military Sea Transportation Service in granting recent charters in the open market.

The agency awarded contracts for 10 clean tankers for use in December at rates ranging from 5 to 20 per cent under basic Maritime Commission rates and nine black tankers at 15 to 20½ per cent under basic rates. These compared with charters made for previous months at as much as 30 per cent below basic commission rates for clean tankers and 35 per cent for black vessels.

Interstate Law Expands

WASHINGTON.—A Supreme Court decision involving a couple of bakeries laid down the principle last week that it is unlawful for a seller engaged in interstate business to cut the price of intrastate sales for the purpose of destroying competition or eliminatitng a competitor.

The fact that the victim of such a practice is only a local merchant and no interstate transactions are used to destroy him does not remove him from the protection of the law, the court held.

"It is, we think, clear that Congress by the Clayton Act and Robinson-Patman Act barred the use of interstate business to destroy local business, outlawing the price cutting employed by respondent," Justice William O. Douglas said in handing down the court's opinion.

The petitioner in the case was forced out of business and brought suit for treble damages under the Robinson-Patman Act. A jury found for the petitioner, but the Court of Appeals reversed the decision and in turn was reversed by the Supreme Court.

The same issue has been involved in cases brought by the Federal Trade Commission, including a current proceeding against the Warren Petroleum Corp., an Oklahoma company, which is charged with selling liquefied petroleum gas at "unreasonably low" prices in the Lake Village, Ark., area with the intent to suppress competition.

Escape-Clause Test Set

WASHINGTON.—Validity of escape clauses in contracts for sale of natural gas to interstate pipelines will be tested before the Federal Power Commission next month.

The commission last week suspended Skelly Oil Co.'s notice of intent to terminate a contract for the sale of gas to Lone Star Gas Co. Hearing on the matter was set for January 10.

The commission's order, issued on request of Lone Star, asserted that the contract provisions show the sale takes place in Oklahoma after processing of the gas at the Velma, Okla., gasoline plant operated by Skelly. The gas is then transported by Lone Star to its pipeline system near Petrolia, Tex.

These facts, the commission said, indicate that the sale is subject to its jurisdiction under the Supreme Court decision in the Phillips Petroleum Co. case. Skelly was ordered to show cause why it should not be classified as a natural gas company, why it should not be required to comply with the provisions of the Natural Gas Act, and why it should be allowed to cancel the contract.

The Skelly case is one of two involving application of the escape clause now pending before the commission. The other involves the threatened termination of service by 14 producers to the Texas-Illinois Natural Gas Pipeline Co., on which the commission has taken no action. Escape clauses permit producers to cancel sales contracts if gas production is made subject to government regulation.

FPC Delays Hearing

Action gives time to push new bill through Congress

WASHINGTON.—Oral argument on the principles and methods to be applied in regulating the prices of independent producers of natural gas has been postponed by the Federal Power Commission from December 15 to January 11.

Announced purpose of the postponement was "to accommodate numerous interested persons who requested more time to prepare for the argument before the commission."

The delay will give the industry additional time to make a drive for quick enactment by Congress of legislation amending the Natural Gas Act to exempt independent producers and gatherers from federal control.

A number of bills with such provisions will be introduced early in the session, which opens January 5. Efforts will be made to secure prompt consideration of the legislation by House and Senate committees in an attempt to get it to the floor before the FPC takes final action on its new regulations.

Task evident . . . The commission now has a good idea of the volume of work which it will have if regulation of producers' rates becomes permanent. Many thousands of applications for certificates of authority to sell natural gas flooded the commission as the December 1 deadline for filing approached. Many applications for rate increases also have been submitted to the commission.

The commission has never announced formally the standards by which it is deciding what applications for increases shall be accepted and what shall be suspended for investigation.

In postponing the date of the oral

argument, the commission also extended the time for filing briefs and applications for a hearing. The deadline for interested parties to submit their views and comments in writing was extended from December 13 to January 7, and those desiring to participate in the oral argument now have until December 30 to notify the commission's secretary, instead of until December 3 as previously set.

Price War Studied

Senate committee probing New Jersey gasoline setup

WASHINGTON.—A study of the competitive conditions which lead to gasoline-price wars was under way last week by the Senate small business committee.

The laboratory, and the situation which led to the investigation, will be the price wars which are going on in New Jersey.

As a first step, questionnaires have been sent out to the 12 major suppliers in the state asking for information about marketing relations with service station operators. Public hearings are expected to be held after Congress convenes next month.

The major casualties of gasoline-price wars are the independent operators, Sen. Edward J. Thye of Minnesota, chairman of the committee says. Thye, a Republican, will relinquish his committee leadership when the Democrats organize the next Congress, but the probe will be continued under Sen. John J. Sparkman of Alabama, who is expected to succeed him.

Purpose of the committee, Thye said, is to help alleviate "the serious competitive situation in which independent operators become enveloped as a price war breaks out and, many casualties later, comes to an end.

"It is believed that once the economic ills of a price war are recognized and understood, all interested parties will strive in a spirit of good faith to devise a sound and equitable solution to the independent operators' gravest competitive peril, the gasoline-price war," he added.

Leasing Changes Planned

WASHINGTON. — Noncompetitive oil and gas leases on the acquired lands hereafter will be handled substantially the same as are similar leases on the public domain.

New regulations dealing with acquired-land leases were announced last week by the Interior Department. They will go into effect in February.

The processing and adjudication of noncompetitive leases will be transferred from the General Services Administration to the Interior Department.

WATCHING WASHINGTON

Bertram F. Linz

Road Plan Faces Fight

Latest idea for financing the administration's $101 billion road-building program is for the Government to raise its share by committing receipts from federal taxes on gasoline and lubricating oils as security for revenue bonds to be issued by a federal commission.

This would avoid the necessity of asking Congress for funds each year during the life of the program, but it would give permanent status to taxes originally adopted as a temporary expedient.

The idea, however, will not be put over without a fight. There is no great objection to dedicating gasoline-tax receipts for highway construction. But the lube tax is a different matter.

Only about half the lubricating oil goes for automotive use. The rest is for industrial consumption, and the railroads are one of the major buyers. Thus the railroads would be required to pay taxes to build highways over which trucks would operate in competition with them. It can safely be said the railroads wouldn't think much of the idea.

The railroads already complain that the trucking industry has tax advantages to which it is not entitled. Now they may be called on to help finance facilities for their fiercest competitor.

Fuel Policy Preview?

Some tips on possible recommendations of the Cabinet Committee on Energy Supplies and Resources Policy may be found in a report just submitted to the President by a similar committee on minerals policy.

The minerals report was signed by Mobilization Director Arthur S. Flemming and the secretaries of Interior, State, and Commerce, all of whom are members of the fuels committee. So it can be assumed that the general policies recommended for minerals probably will be applied also to oil.

A major recommendation calls for a periodical evaluation "to establish the proper level of efficient domestic production" for mobilization purposes. But it was pointed out that assured access to necessary sources abroad is "indispensable to the operation of an active economy and a sound defense."

A second major recommendation is that the tax structure be periodically reviewed to eliminate, where possible, elements which discourage the sound development of the nation's mineral resources.

A third calls for acceleration of Interior Department activities which must precede or supplement private exploration, such as topographic and geologic mapping, geologic research, and development of geochemical and geophysical theories and techniques.

"The committee believes that the government has an obligation to assure that the mineral resources of the nation be developed, conserved, and utilized in the best possible manner over the longest possible period in order to enhance its security and commerce," the report stated. "Development of mineral resources is, of course, primarily a function of private enterprise. The Government must, however, continue to assist in many ways.

"The committee believes that the search for new sources of mineral wealth within the United States needs to be pressed more vigorously. Evidence obtained through geologic investigations suggests that abundant mineral wealth awaits discovery."

Seismic Puzzle Untangled

Seismograph operations not only help in finding oil but they also help scientists solve some puzzles.

One of these puzzles has been the continuous agitation of seismic instruments for a long period after arrival of the first shock. Instead of sharp impulsive movements corresponding to wave fronts arriving by different paths, a continuous ground motion is detected after the first impulse.

Now comes the Carnegie Institution of Washington with a "simple" explanation. It seems the impulsive wave in passing through hills and valleys causes each of these structures to send out secondary wave motions, and many of these secondary waves set off further reactions with a slower speed than that of the primary impulse. Thus a receiving instrument, after the first impulse, is hit by surface wave motions which may obscure its response to buried structures.

ferred from Washington to the 14 district land offices of the Bureau of Land Management.

All leases and permits on the acquired land will continue to be subject to the consent of the government agency having jurisdiction over the lands, for which the Interior Department acts as agent, and will be subject to such conditions as the owning agency may prescribe to insure adequate utilization of the lands for the primary purpose for which they were acquired or are being administered.

Beyond that, the same leasing laws and regulations under which public lands are developed will apply to leases on the acquired lands.

The amount of acquired lands acreage that may be held under lease or permit by one party will be limited to the acreage which may be held under the mineral leasing laws. Public domain lease holdings, however, will not be charged against acquired lands lease holdings, nor vice versa.

Line in Stockpile

NSC to get ODM report on East Coast pipeline soon

WASHINGTON.—Whether to stockpile pipe and equipment or only the equipment appears to be the biggest point of difference in planning for an emergency pipeline to the East Coast.

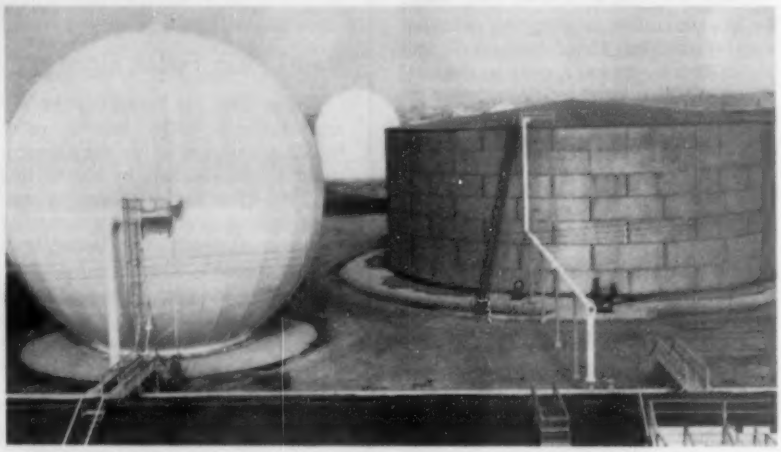
Recommendations of the Office of Defense Mobilization are due to be laid before the National Security Council this month.

Studies of ways of providing landlocked transportation of 750,000 to 1,000,000 bbl. daily of oil or products to the East Coast in case of war have been under way for more than 2 years, first in the Petroleum Administration for Defense and later in the Oil and Gas Division.

Originally proposed as a line to be built by the industry and used by it in peacetime, the idea had to be revamped when the industry flatly turned down PAD proposals. Since then the question has been whether the Government should build the line and keep it in standby, develop a program for linking existing lines into a single system or acquire rights-of-way, do the design, engineering, and stockpile material.

The major consideration in all planning for a government project has been the expense. Any action would have to be supported by an appropriation by Congress. Consequently, what is sought is the best method to assure the line with the least immediate outlay of money. The stockpiling of equipment and with priority to get quick delivery of pipe when needed appears now to be most favored.

WEST COAST



VAPOR-RECOVERY SPHERES that "breathe" in vapors escaping from storage tanks as they are filled or emptied have been installed at Shell's Wilmington and Dominguez refineries. A synthetic-rubber and nylon diaphragm rises and falls to maintain balance between several tanks. If sphere reaches capacity, compressors feed excess vapors into refinery fuel system.

Two Refineries Smogproofed

LOS ANGELES.—Shell Oil Co. has loaded its guns to fight smog at the Wilmington and Dominguez refineries.

The company has completed a $3,866,000 air-pollution control program at both refineries 5 months ahead of schedule, adding some facilities not required under California's Air Pollution Control ordinance.

All storage tanks containing petroleum distillates have been equipped with either a vapor-recovery system or floating roof. The company also has installed a vapor-recovery system on its crude-oil storage facilities; covered open separator pits; fitted special seals on pump glands throughout the two plants; installed additional dust-recovery facilities on its catalytic-cracking plant; and provided for the smokeless burning of vapor emissions beyond the capacity of its recovery system.

In addition, a system to trap emissions from tank-truck loading racks has been built. All racks have been equipped with facilities that catch vapors displaced by gasoline loading and divert them into the refinery fuel system.

Shell began a program in 1930 to control emission of odors, smoke, and dust from the two refineries.

Tejon Discovery Indicated

BAKERSFIELD.—Another oil discovery last week appeared imminent for the Tejon-Grapevine field, 20 miles south of here, where 12 wells are producing some 2,500 bbl. daily from an Olcese sand discovered about midyear.

Drilling & Production Co. 33-33 J.V. produced 35°-38°-gravity crude at an estimated 1,000 bbl. daily rate through a ⅛-in. choke on a drill-stem test at 7,000 ft. Production was from the Jewett sands, 1,000 to 1,200 ft. deeper than the Olcese.

P. G. & E. Plans New Line

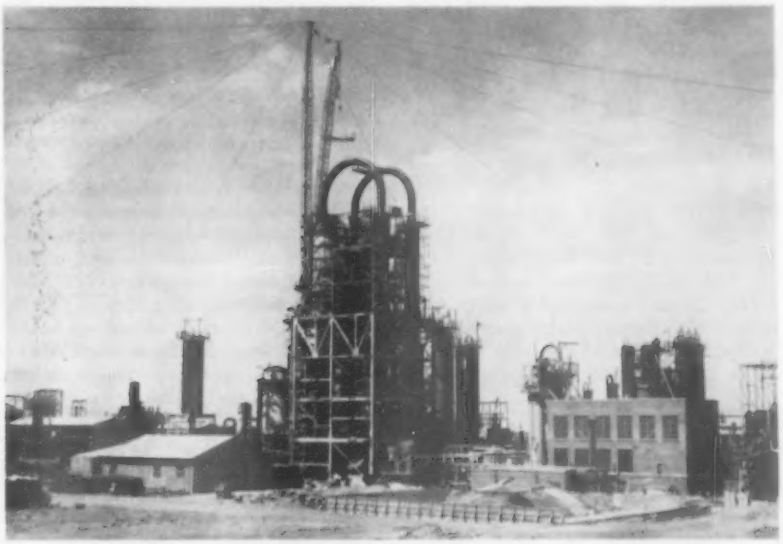
LOS ANGELES.—Pacific Gas & Electric Co. will begin construction before the end of the year on an 18-mile, 12-in. pipeline to provide an outlet for two new middle Sacramento Valley gas fields.

The $850,000 line will connect the Beehive Bend and Princeton fields with the company's gathering system near Gridley, Colusa County. At that point the gas will join that from the Wild Goose field and be transported to Yuba City in a recently completed 16-in. line.

Navy Approves Unit Plan

LOS ANGELES.—The Navy Department has approved plans of Standard Oil Co. of California and Honolulu Oil Corp. for unitizing the Antelope shale zone in the Buena Vista field, westside San Joaquin Valley.

Approval will permit the two companies to develop the pool, in Naval Petroleum Reserve 2, in accordance with the spotty nature of the fractured shale reservoir.



CATALYST-CONVERSION SECTION of South African coal-to-oil plant.

SASOL Plant Operating

Big South African project produces motor fuel from coal; first products expected on market about end of the year

THE huge SASOL plant, which is designed to synthesize liquid hydrocarbons and chemicals from coal, has gone into operations at Coalbrook, about 50 miles south of Johannesburg, in the Union of South Africa.

The integrated project, which includes facilities for everything from coal mining to fractionation of the final products, was built with government financing by South Africa Coal, Oil & Gas Corp., Ltd. Eventual cost is expected to total $92,000,000.

Some products from the plant are expected to go on the market about the end of the year, but the first motor fuel is not due to be shipped from the plant until early next spring. Full production of about 5,500 bbl. daily is scheduled to be reached near the end of 1955.

Economic justification for the SASOL plant is based largely on the existence of a large coal field adjacent to the Vaal River. At current rate of production, these coal reserves would last an estimated 140 years. Coal-mining costs are only about 70 cents a ton, and the synthesis plant is within relatively short distance of South Africa's heavy-consumption areas of the Witwatersrand.

The SASOL company was established in September 1950. Most of the outlay so far has gone into the synthesis plant itself. A total equivalent to about $5,320,000 has been spent on coal mining, transportation, and handling, and another $5,400,000 by two subsidiaries concerned with housing and marketing. The oil-from-coal plant, including services, license fees, and administration and financial charges during construction, has cost $75,320,000 so far.

Process . . . First step in the oil-from-coal process is the gasification of coal to yield a gas of standard composition and purity. Next step is conversion of this gas into motor fuel and other products.

The plant utilizes improved versions of the original Fischer-Tropsch process. Licenses for the German process were acquired from Ruhr-Chemie, A.G., and associates, and those for the American process from M. W. Kellogg Corp. Both processes were combined by SASOL in one integrated plant suited to local conditions.

Kellogg designed and engineered many of the individual process units. Its subsidiary, Kellogg International Corp., had charge of over-all procurement and construction.

Refinery Job Halted

Dispute over price-fixing threatens Lebanon plant

A JOINT Caltex-Socony-Vacuum company in Lebanon is refusing to accept government gasoline price-fixing which it claims would force it to operate at a loss.

The company is Mediterranean Refining Co., known as Medreco. The company, owned 50-50 by California Texas Corp. and Socony-Vacuum Overseas Supply Co., has had a 9,000-bbl. refinery under construction at Sidon, Lebanon, which was due to go on stream early next year.

Prolonged negotiations with the government over the price question have deadlocked. As an indication of its determination not to accept the government's gasoline price, the company has halted work on the nearly completed refinery and has begun dismissing its force of about 450 construction workers.

The Lebanese Government is insisting that the company charge no more for gasoline than the price charged at the Iraq Petroleum Co., Ltd., refinery at Tripoli. This 10,000-bbl. daily refinery has been meeting a large part of Lebanon's requirements. The government, however, had urged the construction of the Medreco plant because, even with the I.P.C. production, it was forced to import nearly 30,000 tons of motor fuel annually.

The argument . . . The Lebanese public works minister charged that Medreco had acted in bad faith because it was unwilling to produce gasoline for the I.P.C. price. On the other hand, a Caltex official said that the Medreco product would be 80 octane as compared to 62 for production from the Tripoli refinery, and thus would justify the higher price. Furthermore, he said Medreco would have to pay more for crude oil than the Tripoli refinery does.

Both the Tripoli refinery and Medreco's Sidon project are located at terminals of pipelines from Middle East fields and thus charge crude oil from these sources. Sidon is the end of the tapline from Saudi Arabia, and Tripoli is the terminal of one branch of I.P.C.'s system from Kirkuk field.

Although neither the Lebanese Government nor the company gave any indication of backing down, it was generally expected that the dispute would eventually be settled. Lebanon badly needs the production which the new

refinery, to cost around $8,500,000, would provide.

The original Medreco agreement with the Lebanese Government gave the government the right to fix gasoline prices, but, according to the Caltex official, it was understood this price would provide a reasonable profit. Apparently this point was not explored fully at the time. The Caltex official blamed the impasse on changes in composition of the government.

Pemex Hits in Tabasco

Petroleos Mexicanos apparently has a significant oil discovery at La Venta field, in Tabasco, where a series of earlier wells found oil in noncommercial quantities.

Antonio J. Bermudez, general manager of Pemex, said the new well, 9 La Venta, produced 39°-gravity crude at the rate of 302 bbl. daily from the interval at about 4,698-4,777 ft. Flow was through 7/32-in. choke.

The field is in a swampy area on the bank of the Tonala River. Bermudez said drilling started in the area in 1941 and that five wells had found some oil shows since then. No. 10 La Venta is to be spudded within a few days, Bermudez said.

Israel Wildcat Spudded

The latest of a series of wildcat wells being put down in Israel has been undertaken by Israel-American Oil Corp.

The company has spudded its first test, Rekhme 1, 25 miles south of Beersheba on the edge of the Negev Desert. The hole is projected to go below the Triassic to about 8,000 ft. Water Works, Ltd., using a new Ideco 750, has the drilling contract.

The well is the fifth started in Israel by the group of smaller companies that took acreage under Israel's 1952 petroleum law. Israel has high hopes that the programs will give the country its first production.

Israel-American is an outgrowth of a partnership between Husky Oil Co., Cody, Wyo., and the New York investment firm of Bear, Stearns & Co.

Gulf Moves Office

London headquarters will manage operations in East

GULF OIL CORP. is moving its Eastern Hemisphere production office from New York to London in a plan to get headquarters personnel closer to field operations.

Transfer of headquarters to London became effective December 1, but the office force has not been completed. It is understood that only a small number of Gulf executive and technical personnel will be shifted from New York and that the remainder of the personnel will be hired in London. Hamilton plans to establish residence there early in January, along with several members of his staff.

Eastern operations . . . Gulf has several exploration or production operations in the Eastern Hemisphere, the principal one being in Kuwait. Gulf has half interest with Anglo-Iranian Oil Co., Ltd., in Kuwait Oil Co., Ltd.

Gulf made a discovery early this year in Sicily and recently started production on a commercial scale there.

The company also has a minority interest in Esso Standard, S.A.F., which made an important discovery in southwestern France early this year. Gulf discontinued exploration programs recently in Denmark and Tunisia but is continuing work in Mozambique, Portuguese East Africa.

About 2 years ago supervision of the Venezuelan operations in which Gulf is interested was shifted from the foreign production office in New York to Pittsburgh. Thus, the shift of the Eastern Hemisphere management leaves only Western Hemisphere affairs, less those in Venezuela and Canada, conducted out of New York.

Aside from production activities, Gulf maintains local sales offices and the company marine headquarters in New York.

Dhofar Expedition Under Way

A $1,500,000 cargo of exploratory drilling equipment — the largest ever loaded on a single ship at Houston —this week is on its way to Alexandria, Egypt, en route to Arabia.

The equipment and supplies—everything needed to establish a camp and begin drilling operations—will be used by Dhofar Cities Service (Cities Service Oil Co. and Richfield Oil Corp.) to drill a wildcat on its concession in Dhofar, a province of the Sultanate of Muscat and Oman bordering the Arabian Sea.

The initial test will be drilled 130 miles inland across the now-roadless Quara Mountains.

Drilling equipment includes a 12,000-ft. National 80 rig and 16,000 ft. of 4½-in. drill pipe, a Failing spudder for stratigraphic tests, and a water-well unit.

The general cargo includes a fleet of tractors and trucks, prefabricated houses, trailers, furniture, air-conditioning units, and radio equipment.

Vehicles include eight oilfield trucks, six power wagons, four jeeps, four Athey wagons, a motor-patrol grader, a Caterpillar D-7, and a garden tractor equipped with special sand tires.

After unloading at Alexandria, the cargo will be reloaded on two LSTs, which will be beached at the port of Salala. Included in the shipment are 27 sections of heavy oak-and-steel landing strip, which will make a 405-ft. "roadway" from the LSTs to shore to facilitate landing of the motorized equipment.

EGYPTIAN FREIGHTER loads equipment at Houston for the Middle East.

Concession Acquired

Standard-Vacuum granted British Somaliland area

STANDARD-VACUUM OIL CO. has acquired concession rights in British Somaliland in East Africa as the latest move in the widening exploratory activity of this company.

The exploration rights in British Somaliland cover 11,380 sq. miles and were acquired through an assignment from Moriqui Exploration Co., Los Angeles. Moriqui filed on the acreage early in 1953 and has been doing geological work following an aerial survey.

Standard-Vacuum's entrance into British Somaliland brings a second large American company into exploration work in this territory. An earlier concession over about 36,000 sq. miles was acquired by Conorada Petroleum Corp. on behalf of its three parents, Continental Oil Co., Ohio Oil Co., and Amerada Petroleum Corp. The Conorada group has been doing seismograph work on indicated prospects.

Standard-Vacuum announced that it would continue and expand the geological work initiated by Moriqui. The acreage held by Moriqui is in two concessions. The larger borders on the Gulf of Aden, extending eastward from Berbera approximatetly 100 miles and inland up to about 70 miles. The other is southwest of Hargeisa, bounded on the west and south by the Ethiopian border.

The British Somaliland concession deal is the third negotiated by Standard-Vacuum the past year. About a year ago, it worked out an agreement with the Indian Government covering 10,000 sq. miles in the Bengal Basin, and in September with the Pakistan Government for a total of 20,000 sq. miles in East and West Pakistan.

The company is interested in a joint-exploration venture in Australia and another in New Guinea, and has filed for concession acreage in Luzon in the Philippines. Aside from a share in the small output of Netherland New Guinea, its only production at present is in Indonesia.

International Briefs

Exploration work in the Sudan will be undertaken soon by Anglo-Iranian Oil Co., Ltd., according to announcement by Ismail El Azhari, the first Sudanese prime minister. He said he had reached an agreement with Sir William Fraser, chairman of Anglo-Iranian, under which an exploration group would be sent to the Sudan in the near future.

Standard-Vacuum Oil Co. has recently made application to the Government of India for permission to carry out geological reconnaissance in a small area in the Pubjab, the deputy minister for natural resources recently told the Indian Parliament.

British firms booked orders valued at £17,721,600, or about $49,500,000, for oil-industry equipment and materials during the third quarter of the year. According to the tabulation of the Council of British Manufacturers of Petroleum Equipment, the largest single item during the quarter was bulk chemicals valued at £3,916,000 or about $11,000,000. During 1953, orders totaled £67,124,000 or $188,000,000, averaging nearly $45,50,000 a quarter.

Work is moving ahead rapidly on the new 40,000-bbl. daily Burmah-Shell refinery at Bombay, which is scheduled to be brought into operation early next year. The refinery is being built near Standard-Vacuum's new 25,000-bbl. daily Bombay refinery which was formally opened November 19.

Lube Plant Erected in Jungle

ASSAM OIL CO., LTD. (Burmah Oil Co., Ltd.) has placed new processing facilities in operation in Assam, northeast India. New and proposed expansions will enable the company to meet an estimated 10 per cent of India's petroleum requirements.

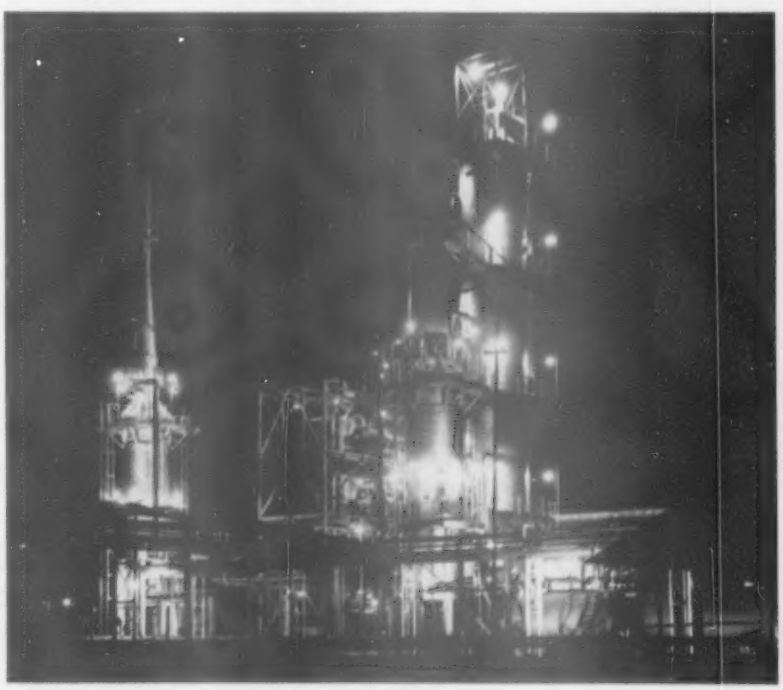
Expansion and modernization work followed the discovery of a new oil field at Nahorkatiya last year. The company's only other production comes from the 65-year-old Digboi field.

The new facilities consist of a lubricating-oil plant and an absorption gasoline plant. The company also has increased the capacity of its Digboi refinery from about 5,150 to 7,150 bbl. daily. Capacity is expected eventually to be raised to nearly 11,000 bbl. daily.

The new lube plant manufactures about 700 bbl. of lubricants daily. The gasoline plant processes 9,000,000 cu. ft. of gas per day and has a daily yield of about 1,700 bbl. of natural gasoline.

A new 23-mile, 8-in. pipeline also has been put in operation to move crude to the refinery from Nahorkatiya field. The line will allow full production of the new field.

The company has announced that its fourth well at Nahorkatiya has been completed as an oil producer at a depth of 10,697 ft. Each of the three previous wells is capable of producing more than 500 bbl. daily. A fifth well is being drilled, and a sixth is due to be undertaken soon.



THIS NEW lubricating-oil plant is the latest addition to the Assam Oil Co., Ltd., refinery at Digboi, in the jungle-covered northeastern tip of India.

TODAY'S DRILLING FLUIDS . . . A Symposium

There is no single factor which accounts for the phenomenal drilling rates now being achieved in deep wells. But advances in drilling-fluid technology is, without doubt, responsible for an important part of this fast drilling. Moreover, vastly improved completions are being made in many areas because recognition is given to the importance of having a suitable fluid in contact with the pay formation. Here in this symposium are four articles which represent current thinking on drilling and completion fluids. In order, they deal with . . .

1. Stanolind's new fluid. This is the first published information on this product, and even since this article was written, successful use of this emulsion has expanded severalfold.

2. The mud developed to solve the casing-collapse problem that has been assuming disastrous proportions in the Williston basin.

2. Stopping Gulf Coast hole troubles before they start by using low-solids mud.

4. A nonfluorescing oil and emulsifier that is removing a long-standing objection to the use of oil-emulsion muds.

New Drilling Fluid Passes Tests

Multipurpose Water-in-Oil Emulsion Mud

A new water-in-oil emulsion mud is now available after having undergone successful field tests as a completion and workover fluid in Beaver Creek field, Wyoming, and Spindletop field, Texas. The new fluid has essentially the same properties as proprietary oil-base muds; but in contrast to the latter, it is not objectionable to handle, is easy to mix, and is noninflammable. Applications visualized for this mud are: (1) drilling salt and anhydrite sections; (2) completing water-sensitive pay formations; (3) workover fluid; and (4) gun-perforating fluid.

by J. L. Lummus

THE drilling industry has long needed a nonaqueous drilling fluid for completing pay zones whose productivity is impaired by water-base fluids. A number of oil-base muds have been developed for this purpose, and their effectiveness in preventing damage to productive formations has been conclusively proved.[1,2]

Oil-base muds, however, have several well-established disadvantages, namely, they are high in cost, objectionable to handle, and are difficult to mix and control. These disadvantages have stimulated considerable research activity toward the development of improved oil-base and emulsion drilling fluids. This research has centered around water-in-oil emulsions and a number of these muds[3] have been developed and commercialized which, although having essentially the same advantages as oil-base muds, largely overcome their disadvantages. Oil-base muds, however, have properties which make them superior for use as packer fluids and for special coring operations.

In the past, the term "emulsion mud" has usually implied an oil-in-water-type system in which dispersed droplets of oil are suspended in water, the continuous phase. Water-in-oil systems are just the reverse; that is, oil is the continuous phase which forms a film around finely dispersed water droplets. Making a stable water-in-oil emulsion depends to a large extent on the choice of the emulsifying and stabilizing agents. The latter of these two types of chemicals determines the stability of the emulsion to various contaminants encountered in drilling operations.

Composition and Properties

The presently described new emulsion fluid (Fig. 2), known commercially as No-Blok,* is prepared by addition of a dry, free-flowing concentrate to the proper ratio of oil and water. The dry concentrate, which is packaged in 100-lb. bags, consists of a mixture of clay, emulsifying agents, salts, and stabilizing agents. A barrel of No-Blok is prepared by addition of from 30 to 50 lb. of concentrate to 0.4 bbl. oil and 0.6 bbl. of either fresh or salt water.

Typically, a No-Blok mud prepared with 40 lb. concentrate, has a Stormer

*No-Blok concentrate is manufactured and distributed by Magnet Cove Barium Corp. U. S. Patent 2661334; application for other patents pending.

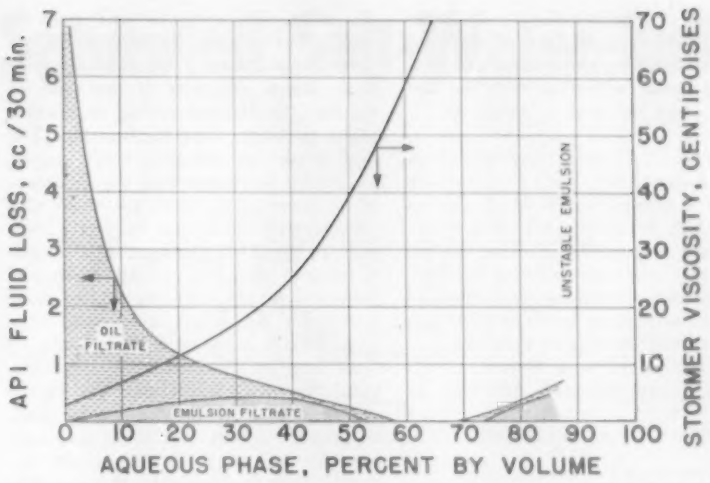

API FLUID LOSS, cc / 30 min.
STORMER VISCOSITY, CENTIPOISES
AQUEOUS PHASE, PERCENT BY VOLUME
OIL FILTRATE
EMULSION FILTRATE
UNSTABLE EMULSION
0 10 20 30 40 50 60 70 80 90 100
1 2 3 4 5 6 7
10 20 30 40 50 60 70

Fig. 1—To achieve satisfactory fluid loss and viscosity, the emulsion should contain a minimum of 40 per cent water.

Fig. 2—This dry, free-flowing concentrate is added to oil and water to form new emulsion fluid.

viscosity of 60 cp., 1-2 gels, and fluid loss of 0.1 cc. (oil). This mud can be weighted with barites to 15 lb. per gallon, and is not adversely affected by common oil-field contaminants such as salt, cement, and anhydrite. This mud is not objectionable to handle because of its neutral color and can be mixed easily without an elaborate hookup.

Range of composition . . . Fig. 1 shows the viscosity and fluid-loss properties of emulsions wherein the oil (external) and water (internal) phases were varied from 100 per cent diesel oil to 100 per cent saturated salt water. The results show that when the volume of the oil phase exceeds that of the water phase, the viscosity of the prepared emulsions is low and the fluid losses high. The exact opposite is true when the volume of the internal phase (water) exceeds the external phase. Thus, to achieve satisfactory physical properties, the emulsion should contain a minimum of 40 per cent water and not more than 60 per cent oil. In field practice, an intermediate range (60 per cent water—40 per cent oil) is normally used so as to permit dilution with either phase without seriously affecting the physical properties of the emulsion.

Either fresh or salt water can be used as the internal phase of this emulsion. Refined oils, for example, diesel oil, are preferred as the external phase, since their use permits better control of the physical properties of the emulsion. However, test results have demonstrated that satisfactory emulsions can be prepared with selected high-gravity crude oils. For economic reasons, utilization of crude oils in place of refined oils will probably become more extensive as field experience with this drilling fluid progresses.

Range of concentrate . . . Table 1 shows the properties of typical emulsions prepared by adding different amounts of concentrate to both refined and crude oils. The emulsions prepared with diesel oil contain 60 per cent water and 40 per cent oil whereas the emulsions prepared with crude oils contain 50 per cent water and 50 per cent oil. This adjustment in phase concentration is necessary when crude oils are used in order to obtain lower viscosity and gel properties.

From 35 to 50 lb. of concentrate per barrel of mud is required to prepare a satisfactory emulsion with diesel oils; but, as the data show, this range of concentrate may be reduced to from 25 to 35 lb. per barrel when using crude oils. Crude oils, however, have varying effects on the properties of the emulsion mud and pilot tests are required prior to a job in order to select the most satisfactory crude and the optimum amount of concentrate to use with it.

Effect of Contaminants

Table 2 shows the effects of various oil-field contaminants on the physical properties of this mud. Addition of up to 10 lb. per barrel of anhydrite, cement, or lime has no deleterious effect. Contamination with as much as 50 per cent fresh water or natural drilling mud does not significantly increase the viscosity or gel properties of the emulsion. Addition of up to 60 lb. per barrel of Wyoming bentonite and 80 lb. per barrel of several brands of low-yield clay increases the viscosity and gel properties, though not excessively, but does not cause inversion of the emulsion.

Shale hydration tests . . . Table 3 presents the results of tests made to compare the effectiveness of No-Blok with other typical mud systems in preventing hydration of bit cuttings. In these tests, 100 lb. per barrel of −10-+20 mesh Gulf Coast shale cuttings was added to the various muds and the samples rolled for 96 hours at a temperature of 160° F. At the end of this period, the shale cuttings were recovered and screen analysis made to determine the relative amount of dispersion of the shale in the various mud systems. In these tests, the amount of dispersion due to mechanical action was not significant; therefore, the method used gives a reasonably accurate measure of the degree of hydration obtained.

It will be noted that whereas the shale cuttings hydrated and dispersed to a high degree in the water-base muds, very little hydration occurred in either No-Blok or conventional oil-base mud.

Temperature stability . . . The stability of No-Blok under elevated temperature and pressure conditions was determined. Data on these tests are presented in Table 4. Static as well as flowing conditions were simulated.

It will be noted that the present formula exhibits excellent resistance to

THE AUTHOR

J. L. Lummus is a technical group supervisor in the research department of Stanolind Oil & Gas Co., Tulsa. He graduated in 1942 from Erskine College with a B.S. in chemistry and physics and worked as a chemist with the Du Pont company until 1944, when he entered the U. S. Navy. Lummus joined Stanolind in 1946 as a junior chemist. In 1949 he was made research chemist, and has since specialized in drilling-mud research. He assumed his present title in 1953.

temperatures as high as 200° F. Modification of the present formula is required if higher temperatures than 200° F. are anticipated.

Effect on formations . . . Sandstone cores, varying in permeability from 100 to 1,000 md., were exposed to this emulsion mud for periods up to 2 weeks at a differential pressure of 100 psi. In order to simulate well conditions, the filter cake was removed at daily intervals during the test period. The tests revealed that little, if any, invasion of emulsion should occur when No-Blok is used as a completion fluid. If, however, a comparatively loose formation containing clays is invaded by emulsion, the productivity should not be impaired since the water droplets are of colloidal size and would be flushed from the formation when the well is produced.

Field tests . . . To date, this water-in-oil emulsion mud has been successfully used as a completion fluid in Beaver Creek field, Wyoming, and as a workover fluid in Spindletop field, Texas. At present, programs utilizing No-Blok as a specialized drilling and completion fluid are either under way or are being planned by several operators.

In the first of two Beaver Creek field tests, approximately 350 bbl. of this mud was prepared and used to core 100 ft. of the Mesaverde formation. In spite of the freezing temperatures which prevailed at the time of the test, no unusual mixing or maintenance problems were encountered. The mud properties remained stable during the coring operations with the exception of an increase in viscosity which was satisfactorily controlled by small additions of diesel oil. Coring time averaged 9 minutes per foot which compared favorably with coring rates experienced in completing other Mesaverde wells with various types of drilling fluids.

In view of this satisfactory performance, the mud was stored for future use in this field. In the second well, an offset, No-Blok was again used successfully in coring the Mesaverde formation with the exception that initially, some additional treatment was required to restore the mud to its original properties.

Productivitywise, the first well completed with this fluid showed a higher initial production than four previous wells completed with various types of muds and the second well was an above-average producer. In Beaver Creek field, however, the Mesaverde formation differs stratigraphically and, for this reason, a definite correlation among types of mud used for completion of the well productivity cannot be established.

In Spindletop field, No-Blok was successfully used for workover operations which consisted of pulling screen and liner, replacing same, and squeezing approximately 10 bbl. of crude oil into the formation. Before workover, the well produced 10 bbl. per day with frequent sand cleanouts required; after workover, the well flowed 84 bbl. per day with 520 lb. tubing pressure. No difficulties were encountered in conducting this job with the emulsion mud and it was stored for future workover or completions in this field.

This mud is not considered to be a general-purpose drilling fluid, but like oil-base muds, inhibited muds, etc., is a specialized mud designed for specific applications. Generally, specialized muds have a high initial cost but when used correctly, often result in a considerable cost savings to the operator.

TABLE 1—EFFECTS OF VARYING AMOUNT OF CONCENTRATE

		Physical properties, A.P.I. R.P. 29*			
			Stormer gel strength, grams		
Base oil—	Concentrate (lb./bbl.)	Stormer Viscosity, cp.	Initial	10 min.	Fluid loss, cc./30 min.
Diesel oil, 34° gravity	12	44	0	1	1.9 (1.0 oil)
	25	50	1	1	1.4 (0.5 oil)
	35	56	1	2	0.1 oil
	50	59	1	3	0
Slaughter field, Texas, composite crude oil, 30° gravity	12	135	1	1	2.7 (1.7 oil)
	25	170	1	4	0
	35	190	3	5	0
Midland Farms field, Texas, Grayburg crude oil, 33° gravity	12	83	0	0	1.8 (1.0 oil)
	25	103	0	0	0.9 (0.7 oil)
	35	122	1	1	0

TABLE 2—EFFECTS OF CONTAMINANTS ON THE PROPERTIES OF WATER-IN-OIL EMULSION MUD

		Physical properties, A.P.I. R.P. 29			
			Stormer gel strength, grams		
Contaminant—	Pounds per barrel	Stormer viscosity, cp.	Initial	10 min.	Fluid loss, cc./30 min.
None		50	1	3	0.1
Anhydrite	10	60	1	3	0.1
Cement	10	59	1	2	0
Lime	10	61	1	2	0
Fresh water, bbl.	0.5	170	9	11	0
Natural mud, bbl.	0.5	165	5	13	0
Wyoming bentonite	60	143	2	5	0
Brand "A" low-yield clay	80	135	1	4	0
Brand "B" low-yield clay	80	135	10	18	0

TABLE 3—DEGREE OF HYDRATION OF BIT CUTTINGS OBTAINED IN NO-BLOK AND OTHER TYPICAL MUD SYSTEMS

	A.P.I. Stormer viscosity—		Degree of hydration
Type of drilling fluid—	Initial	After rolling for 96 hr. at 160° F.	(% shale through 20-mesh screen)
Water-in-oil emulsion mud	59	64	11
Oil base*	140	155	4
Natural Gulf Coast	35	250	90
Saturated salt	18	39	65
Lime base	20	69	56

*Contained 5 per cent fresh water.

TABLE 4—EFFECT OF ELEVATED TEMPERATURES AND PRESSURES ON NO-BLOK

	Physical properties, A.P.I. Code 29—			
	Stormer	Stormer gel strength, grams—		
Test conditions—	viscosity, cp.	Initial	10 min.	Fluid loss, cc./30 min.
None	59	1	3	0
200° F., 3,000 psi. for 8 hours, stirred at 50 r.p.m.	65	1	4	0
200° F., 3,000 psi. for 48 hours, static	60	1	3	0.2
350° F., 3,000 psi. for 8 hours, static*	68	2	4	0.4

*Additional stabilizing agents used.

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Saturated Salt-Water-Emulsion Mud

Fig. 1—Casing failures are reported in Tioga and Beaver Lodge fields and in the Pine Unit and Little Beaver areas.

Solves Williston Problem

Saturated salt-water-emulsion muds are practical to prepare and easy to maintain. They have not increased the drilling time on the wells used even though drilling practices which are normally considered factors in reducing drilling rate, have been resorted to by the contractors, in an effort to help minimize hole enlargements in the salt beds. Saturated salt-water-emulsion mud is providing the solution to the hole-management problem in the salt beds with surprisingly very little extra trouble and expense to the involved operators and contractors.

by E. E. Huebotter, B. W. Emerson, and F. A. Scearce

AT least 15 cases of well casing failure opposite thick salt beds in the Williston basin have occurred in recent months. Most engineers feel that the cause is the caving into solution caverns and hole enlargements of unsupported formations above. As a result some operators are now drilling their new wells with saturated salt-water mud to prevent the solution of the salt beds. If solution caverns and hole enlargements are thus prevented in drilling, there is no tendency for casing to collapse at a later date in the completed well.

Two great folds stand out in the Williston basin, on which casing failures opposite thick salt beds have been reported, these being the Cedar Creek anticline in eastern Montana and the Nesson anticline in northwestern North Dakota. All production casing in the Cedar Creek and Nesson anticlines penetrates several thick beds of salt and possibly a greater portion or all of the wells previously drilled disregarding salt problem may experience casing failures during the next few years.

Authors are with Baroid Sales Division, National Lead Co.

Most production from fields on the Cedar Creek anticline comes from the Devonian or Ordovician. On the Nesson anticline and in the adjoining areas production comes from the Madison lime in the lower Charles or from deeper formations. To reach these productive horizons some 5,700 to 5,900 ft. of bentonitic shale, limestone, sandstone, and calcareous shale must first be penetrated above the Piper or Spearfish. These formations represent the Tertiary, Cretaceous, and Jurassic systems and contain no salt, gypsum, or anhydrite contamination.

Native mud is used to drill these formations and is usually treated with small amounts of sodium tetraphosphate and/or caustic soda-Tannex to control the mud density and viscosity and reduce the water dilution. Some 10,000 to 12,000 bbl. of water is usually needed to drill this section if no chemical is used, which is reduced to 5,000 to 6,000 bbl. when chemical is used.

On top of the Piper or Spearfish, containing massive and stringers of gypsum and anhydrite, the native mud is usually converted to either a gyp-base mud or a red Driscose mud depending upon the amount of salt expected to be penetrated later. Red Driscose mud is normally used only where the expected subsequent salt contamination will not exceed 25,000 p.p.m., whereas gyp-base mud is chosen for expected subsequent salt contamination of 25,000 p.p.m. to saturation. These muds are used to drill the lower section of the hole to the productive horizons penetrating the lower Jurassic, Triassic, and Mississippian formations which contain gypsum, anhydrite, shale, limestone, dolomite, sandstone, and salt beds.

Salt, gypsum, anhydrite . . . In the Cedar Creek anticline the gypsum and anhydrite beds thicken toward the northwest extremity of the anticline whereas the salt beds become thinner to almost pinching out. In the Nesson anticline it has been observed that the salt beds in the Spearfish become thinner toward the northeast extremity of the anticline. Thick beds of salt up to 140 ft. in thickness exist in the Charles above the Madison limestone in the Nesson anticline and middle and lower extremity of the Cedar Creek anticline. These salt beds dissolve rapidly in gyp-base, red Driscose, as well as any unsaturated water-base mud producing solution caverns and hole enlargements, sometimes of enormous proportions.

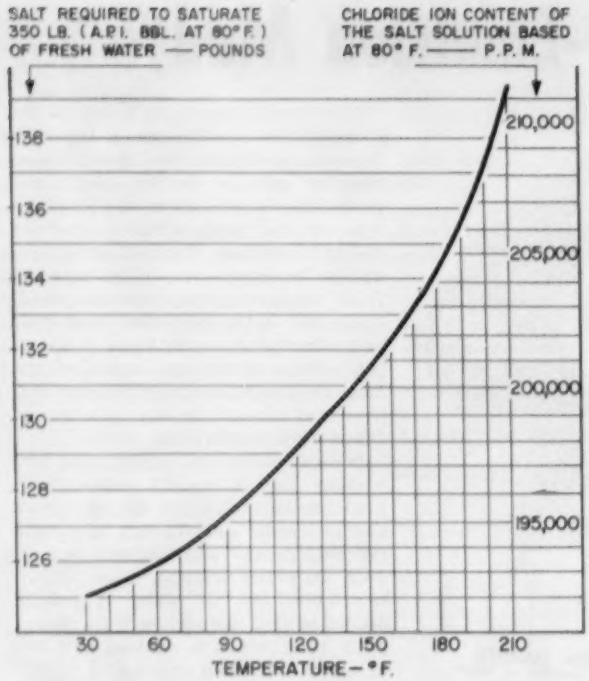

Fig. 2—A mud saturated with salt at 80° F. is capable of dissolving considerably more salt at flow-line temperatures.

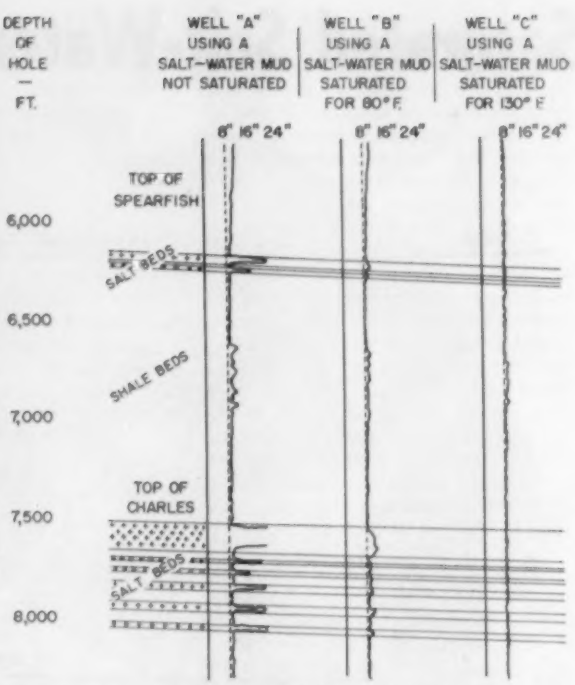

Fig. 3—Caliper logs of wells drilled with: (A) a fresh-water mud; (B) a salt-water mud saturated at 80° F.; and (C) a salt-water mud saturated at 130° F.

These caverns and hole enlargements in the salt beds remove support to the formations above them in the vicinity of the bore hole.

Casing failures on both . . . After drilling wells through the Spearfish and Charles salt beds for the past 2 or 3 years with the above muds, casing failures began to first show up opposite the Charles salt beds and then in the Spearfish salt beds. It is the consensus of many engineers that the formations left unsupported above the solution caverns and hole enlargements have weakened during the past 2 years, more or less, and caved into the solution caverns and hole enlargements and collapsed the casing. To date more than a dozen casing failures have been reported in Tioga and Beaver Lodge fields and three or more in the Pine Unit and Little Beaver areas. To forestall future failures, one of the largest operators in the basin initiated the first saturated salt-water mud in Beaver Lodge field on the Nesson anticline of North Dakota.

New mud had difficulties . . . A problem anticipated with the use of a saturated salt-water mud in this area was that the density of the mud would be so great that loss of circulation would result. With the solid buildup existent, mud densities of 11.3 to 11.7 lb. per gallon would have resulted by using a saturated salt-water mud (saturated salt water has a density of slightly in excess of 10.0 lb./gal. to start with). Crude oil was introduced into the saturated salt-water mud to reduce its density to a point that circulation would not be lost. A saturated salt-water mud having a density of 11.7 lb. per gallon can be reduced to 11.2, 10.2 and 9.2 lb. per gallon by the addition of 10, 30, and 50 per cent by volume, respectively, of 44°-A.P.I.-gravity crude oil.

The addition of crude oil to a saturated salt-water mud introduced three mud problems: emulsification of the crude oil, control of foaming, and the reduction of resultant high viscosity and gel strengths. A pregelatinized starch normally added to lower the filter loss of salt-water muds adequately emulsified the crude oil. Commercial defoamers reduced the foaming, and calcium ligno-sulfate reduced the viscosity and gel strength as well as further emulsifying the crude oil to reduce the filter loss. See Table 1. Foaming resulting from the addition of calcium ligno-sulfate was adequately controlled by the defoamers used for the crude oil.

On the first wells to use the saturated salt-water-emulsion mud, conversions were made from the salty gyp-base muds in use just before entering the Charles formation. Later it was decided to convert before entering the Spearfish formation because, even though no trouble from collapsed casing opposite the salt beds in the Spearfish had yet been reported, it was thought advisable to keep the salt beds there in gage also, especially where they are relatively thick, so as to preclude any future trouble with them.

Mud saturated for 80° F. . . . Caliper logs from the first wells using saturated salt-water-emulsion mud to drill the

TABLE 1—DEFOAMING, DEAIRENTRAINMENT, AND THINNING OF SATURATED SALT-WATER-EMULSION (20 PER CENT OIL) MUDS

Pregelatinized starch, lb./bbl.	0	3	3	3	0	2	2	2
Defoamer, lb./bbl.	0	0	0.2	0.2	0	0	0.5	0.5
Calcium ligno-sulfate, lb./bbl.	0	0	0	2	0	0	0	2
Density, lb./gal.	8.2	8.4	10.1	10.1	6.7	6.6	9.5	9.4
Per cent air	21	19	2	3	29	30	1	2
Vis., cp.	45	58	50	33	45	75	70	35
Init. gel., g.	30	35	7	0	30	40	40	10
10-min. gel., g.	40	50	70	30	30	50	50	15
pH	6.8	6.9	6.9	6.8	7.8	7.8	7.9	7.8
Fluid loss, A.P.I.	70	14.2	13.9	12.5	44	9.5	9.6	4.6
Oil in filtrate, ml.	5.0	1.1	0.6	0.0	3.0	0.1	0.2	0.0
Salt, p.p.m.	322,000				168,000			

salt beds indicated that very good results were being obtained toward keeping the salt beds relatively in gage. It was noted that the salt beds in Hofflund field tended to get out of gage to a greater extent than those in Tioga field. Since flow-line temperatures of the muds in Hofflund field are about 140° to 145° F. which are 10° to 15° F. hotter than those in Tioga field, it was decided that this condition possibly reflected higher mud temperatures opposite salt beds in wells in Hofflund field, resulting in greater solubility and enlargement of the salt beds.

A barrel of water measured at 80° F. will dissolve approximtely 5 extra pounds of salt when heated from 80° to 150° F. (See Fig. 2). Hence a mud which tests just saturated with salt at 80° F. is capable of dissolving considerably more salt at the elevated temperature of the flow line (130° to 145° F.) or at the bottom of the hole opposite the salt beds where the mud temperatures are undoubtedly much hotter than at the flow line.

Usually 1,500 bbl. or more of water is required to prepare and maintain the saturated salt-water mud used to drill the salt beds. This mud saturated with salt at 80° F. would dissolve an additional 6,000 lb. of salt by dissolving out the salt beds being drilled or having already penetrated when only heated to 140° F., the flow-line temperature of the mud. The amount of salt that would be dissolved could increase as high as 12,000 lb. if the mud temperature opposite the salt beds should attain 185° F. Six thousand pounds of salt dissolved out of 50 ft. of a 9-in. hole drilled through solid rock would enlarge the hole diameter to about 15 in., whereas 12,000 lb. would enlarge the hole in the section to about 19½ in.

Mud saturated for 130° F. . . . The above hole enlargements in the salt beds were well within the range of those experienced in the field. Therefore, steps were taken to carry extra salt in the mud above saturation at room temperature to at least take care of the amount of salt required to saturate the water phase of the mud at the flow-line temperature of 130° F. For a mud having 60 per cent by volume water, around 76 lb. per barrel of salt should be in the mud to completely saturate the water phase at 80° F. At 130° F., around 78 lb. per barrel of salt will be required to saturate the water in the mud, i.e., an excess of 2 lb. per barrel of salt must be suspended in the saturated salt-water mud at 80° F. to take care of the increased solubility of salt in the salt-water phase at the elevated temperature of 130° F.

The usual practice of checking the salt content of the mud filtrate obtained and tested at room temperature will not indicate whether the mud contains sufficient salt to keep the mud saturated at elevated temperatures. Obtaining the mud filtrate and testing it at the elevated temperature was found difficult and impractical. A simple, practical test for determining the salt contained in a saturated salt-water mud is as follows.

Determine or estimate the water content of the mud. A good average value of water content for the saturated salt-water-emulsion muds presently used in the fields on the Nesson anticline would be 60 per cent, varying from 50 per cent to 70 per cent depending upon the entrained air, oil, and total solids content. To 350 ml. of saturated salt-water-emulsion mud containing 210 ml. of water, if 60 per cent by volume, is added 210 ml. of fresh water. The mixture is filtered and the chloride ion content determined by the standard A.P.I. procedure. This answer doubled gives ths chloride ion content of the filtrate from the mud if elevated to a temperature to obtain complete dissolution.

Using the latter determination of chloride ion in the graph in Fig. 2, the maximum temperature to which the mud can be increased without dissolving salt from the salt beds penetrated can be determined.

This graph also gives the pounds of salt dissolved per barrel of water in the mud. If the maximum temperature to which the mud is expected to attain opposite the salt beds exceeds that determined above, then the amount of salt needed per barrel of water in the mud to maintain saturation at the elevated temperature can also be determined from Fig. 2. The difference between what is needed and that determined gives the amount of salt to be added for each barrel of water in the mud. Multiplying this value by the per cent by volume water in the mud gives the amount of salt to add to the mud.

If, for example, in the above test 98,000 p.p.m. of chloride ions were determined in the filtrate from this diluted mud sample at 80° F., then the filtrate from the mud could contain 98,000 multiplied by 2 equals 196,000 p.p.m. of chloride ion if the temperature of the mud were increased sufficiently to completely dissolve all the salt in it. Referring to Fig. 2, it is indicated that the temperature of the mud would only have to be increased to 104° F. to dissolve all the salt in the mud where each barrel of water in the mud would have dissolved approximately 128 lb. of salt. Increasing the temperature above 104° F. for this mud would cause it to dissolve salt out of exposed salt beds.

If the temperature of the mud opposite the exposed salt beds is expected to attain for example 140° F., then from Fig. 2, it is determined that each barrel of water in the mud would dissolve 130.5 lb. of salt, or 130.5 minus 128 equals 2.5 lb. of salt would have to be added for each barrel of water in the mud to prevent the mud from dissolving salt from the exposed salt beds up to 140° F. Multiplying 2.5 by 60 per cent gives 1.5 lb. of salt that would have to be added to each barrel of the mud to prevent its dissolving out salt beds up to attaining a temperature of 140° F.

Maintaining adequate salt . . . A practical method of maintenance of saturated salt-water-emulsion mud on a well to eliminate the necessity of almost all of the above tests and calculations is as follows. All water added to the mud is thoroughly saturated at atmospheric temperature by passing it through a salt barrel before adding it to the mud. For each barrel of saturated salt water added to the mud, 4 to 5 lb. of salt is added to the mud through the mud hopper which provides the extra salt needed to saturate the mud to temperatures of 130° to 145° F.

In-gage holes result . . . In Fig. 3 is shown a comparison of caliper logs from wells from the Spearfish through the Charles having used: (A)—a mud whose salt saturation is a function of what is dissolved from the formations; (B)—a salt-water-emulsion mud maintained saturated for around 80° F., and (C)—a salt-water-emulsion mud maintained saturated for around 130° F.

It is seen that in well A, where the salt content of the mud depended entirely upon the number and thickness of salt beds penetrated and the amount of makeup water added, all of the salt beds dissolved out very badly. The diameter of the hole through many of the salt beds was far beyond the 24-in. limit of the measuring instrument.

In well B, where the salt content of the mud was maintained saturated at an average atmospheric temperature of 80° F. by saturating all makeup water with salt before adding it to the mud, the enlargement of the hole through all the salt beds penetrated was held below 12 in. in diameter. These enlargements resulted from dissolving extra salt to saturate the mud at hole temperatures of 130° F. or more.

In well C, where the salt content of the mud was maintained saturated at 130° F. by saturating all makup water before adding it to the mud plus an additional 4 to 5 lb. of salt for each barrel of makeup water added to take care of the increased solubility of salt at the elevated temperature, the enlargement of the diameter of the hole

through all salt beds penetrated was held very nearly in gage. In fact the enlargements were no larger than that of the shale formation penetrated and can be attributed almost entirely to drill pipe abrasion and drilling mud erosion.

Drilling practices changed . . . Credit is also to be given to the fact that in wells B and C the reversion from jet to conventional bits was made when drilling the salt beds; the pump pressure, weight on bit, and rotary speed were also reduced in an effort to hold to a minimum the abrasion of the salt beds by the drill pipe and their erosion by the drilling mud.

Previous mud program . . . Prior to the realization of casing failures in the Charles salt, the general drilling and mud program for wells on the Nesson anticline, as exemplified by well A in Fig. 3, consisted of spudding in with a bentonite-water mud containing cottonseed hulls and setting surface pipe at about 600 ft. Drilling out from under surface pipe to about 5,900 ft. was done with native mud possibly treated lightly to improve the quality of the mud and reduce the quantity of makeup water required to maintain the viscosity and density. At around 5,900 ft. on top of the Spearfish, the native mud is converted to a gyp-base mud to drill the gypsum in the top of the Spearfish and the subsequent salt beds in the Spearfish and Charles. From 3 to 5 per cent by volume crude oil was maintained in the mud below 7,000 ft. to the total depth of about 8,300 ft. in the top of the Madison to improve the drilling rate, lower the torque on the drill pipe, improve the filter-loss characteristics of the mud, etc.

Tables 2 through 5 are the drilling and mud records of the typical well exemplified as well A in Fig. 3. The well was spudded in with a bentonite cottonseed-hull water mud and surface hole drilled to a depth of slightly over 600 ft. and 600 ft. of 10¾-in. surface casing was set and cemented to surface. Drilling and mud record is shown in Table 2.

Drilling out from under the surface pipe, after the cement had set, was with the spud mud watered back and subsequently thinned with chemical. This native mud with a further light chemical treatment was used to drill to a depth of about 5,900 ft. Drilling and mud record are shown in Table 3.

Thinner saves water . . . Occasionally when an abundant, cheap, good water supply is available, no chemical treatment of the mud is made while drilling below the surface pipe to a depth of 5,900 ft. Drilling and mud record through this upper hole section is shown in Table 4. Normally the only cost involved in this mud is the water used, which is usually neglected in mud-cost calculations because of its nominal value relative to the other materials added to the mud. However, in this area water must be hauled to the wells frequently under adverse conditions of subzero weather, muddy roads, inaccessible locations, etc., at costs occasionally exceeding 50 cents per barrel.

The use of a light chemical treatment in the above mud costing less than $250 will reduce the water needed to maintain the density and viscosity of the mud by at least 5,000 bbl. which, figured at 50 cents per barrel, would cost $2,500 or result in a net saving of $2,250. In addition to the monetary saving made from reduced water consumption resulting from the use of a light chemical treatment, a better quality of mud is maintained without reducing the drilling rate. Frequently weather conditions cause water deliveries to wells to be cut or severely reduced in which case a light chemical treatment usually permits uninterrupted drilling with the mud and water on hand eliminating loss of valuable drilling time.

While drilling at about 5,900 ft. the untreated, or lightly treated, native mud is converted to a gyp-base mud to drill to a total depth of about 8,300 ft. Crude oil is added from 7,000 ft. to total depth. Drilling and mud record is shown in Table 5.

The total average mud cost for drill-

TABLE 2.—WELL A—SPUD MUD

Days drilling	1
Feet drilled	600
Properties of Mud	
Density, lb./gal.	9 to 10
Viscosity, sec.	60
Materials Used to Prepare the Spud Mud	
Water, bbl.	550
*Bentonite, lb.	3,500
*Cottonseed hulls, lb.	1,000
*Cost at well	$110.00
Mud cost/bbl.	$ 0.18
Mud cost/day	$110.00
Mud cost/ft.	$ 0.18

*Cost at well based only on specific products marked with an asterisk.

TABLE 3—WELL A—LIGHTLY TREATED NATIVE MUD

Days drilling	7
Feet drilled (600-5,900)	5,300
Properties of Mud	
Density, lb./gal.	9.9 to 10.2
Vis., sec. A.P.I.	29 to 32
Vis., cp.	10 to 12
Init. gel., g.	0
10-min. gel., g.	0 to 10
pH	8.2 to 8.3
Fluid loss, A.P.I.	9.5 to 10.5
Properties of Filtrate	
Ca, equiv. per M.M.	3.5 to 4.0
Mg, equiv. per M.M.	0.8 to 1.0
Cl, equiv. per M.M., 400 p.p.m.	11
SO_4, equiv. per M.M.	8 to 12
OH, equiv. per MM.	0
CO_3, equiv. per M.M.	3.5 to 4.0
HCO_3, equiv. per M.M.	13.0 to 15.0
Materials used to prepare and maintain the native mud lightly treated.	
Water, bbl.	5,913
*Caustic soda, lb.	50
*Organic thinner, lb.	150
*Sodium tetraphosphate, lb.	150
*Cost at well	$236.00
†Cost/bbl.	$ 0.04
†Cost/day	$ 43.70
†Cost/ft. (600-5,900)	$ 0.06

*Cost at well based only on specific products marked with an asterisk.

†Includes cost of bentonite from spud mud. Mud prepared allows for increase in volume from added mud materials and formation solids.

TABLE 4—WELL A—ALTERNATE UNTREATED NATIVE MUD

Days drilling	7
Feet drilled (600-5,900)	5,300
Properties of Mud	
Density, lb./gal.	9.1 to 9.8
Vis, sec. A.P.I.	30 to 32
Vis, cp.	2 to 7
Init. gel, g.	0
10-min. gel, g.	0
pH	9.1 to 9.2
Fluid loss, A.P.I.	17 to 21
Properties of Filtrate	
Ca, equiv. per M.M.	2.8 to 3.0
Mg, equiv. per M.M.	1.2 to 1.3
Cl, equiv. per M.M., 400 to 1,000 p.p.m.	11 to 28
SO_4 equiv. per M.M.	0 to 1
OH, equiv. per M.M.	0
CO_3, equiv. per M.M.	7 to 8
HCO_3, equiv. per M.M.	2.5 to 3.5
Materials used to prepare and maintain the native untreated mud.	
Water, bbl.	10,325
Cost at well	*
Cost per bbl.	*
Cost per day	*
Cost per ft. (600-5,900)	*

*Depends upon cost of water delivered to well.

TABLE 5—WELL A—GYP-BASE MUD

Days drilling	18
Feet drilled (5,900-8,300)	2,400
Properties of Mud	
Density, lb./gal.	10.1 to 10.3
Vis., sec. A.P.I.	42 to 48
Vis., cp.	55 to 60
Init, gel	30 to 40
10-min. gel	40 to 50
pH	7.5 to 7.8
Sand content, % by vol.	2.0
Oil content, % by vol. (7,000 ft. to TD.)	3 to 5
Fluid loss	9 to 13
Properties of Filtrate	
Preservative, lb./bbl.	0.15 to 0.25
Ca, equiv. per M.M.	80 to 100
Mg, equiv. per M.M.	6 to 12
Cl, p.p.m.	60,000 to 180,000
Cl as NaCl, p.p.m.	99,000 to 297,000
SO_4, equiv. per M.M.	80 to 120
OH, equiv. per M.M.	0
CO_3, equiv. per M.M.	0
HCO_3, equiv. per M.M.	7 to 8
Materials used to prepare and maintain the Gyp-Base Mud	
Water, bbl.	1,738
Crude oil, bbl. (7,000 ft. to TD.)	140
*Gypsum	3,000
*Pregelatinized starch, lb.	15,350
*Preservative, lb.	1,250
*Salt-water clay, lb.	5,800
*Cost at well	$3,375.00
†Cost per bbl.	$ 1.11
Cost per day	$ 188.00
Cost per ft. (5,900-8,300)	$ 1.41

*Cost at well based only on specific products marked with an asterisk.

†Mud prepared allows for increased volume of added materials and formation solids.

ing an 8,300-ft. well, such as above, is in the neighborhood of $3,750 of which more than $3,350 is for gyp-base mud maintained from 5,900 ft. to a total depth of about 8,300 ft. These mud costs do not include the cost of the water or crude oil used in the mud.

Little hole enlargement . . . In view of the recent casing failures in the Charles salt, at least two operators are taking steps to drill an in-gage hole through all the salt beds in the Spearfish and Charles. The general drilling and mud program for these wells is essentially the same as previously described down to 5,900 ft. Then while drilling at 5,900 ft. the untreated or lightly treated native mud is converted to a gyp-base mud. This mud is immediately saturated with salt at 80° F., treated with crude oil to lower the density, defoamer to control the foaming and air entrainment, and calcium ligno-sulfate to control the viscosity and gel strengths, forming a saturated salt-water (80° F.) emulsion mud used to drill to a total depth of about 8,300 ft.

Conventional bits are used in place of jet bits, when drilling the salt beds and the weight on bit, rotary speed, and pump pressure are reduced to minimize hole enlargement in the salt beds. In Table 6 is the drilling and mud record of the typical well using the above mud exemplified as well B in Fig. 3. Even though this mud was maintained saturated at 80° F., hole enlargements of 2 to 3 in. in the salt beds resulted, possibly due to the increased solubility of salt at the increased temperature of 130° F. or more attained by the mud when flowing past the salt beds.

No hole enlargement . . . Since each barrel of the above saturated salt water (80° F.) emulsion mud requires about 5 lb. of salt to keep it saturated at 130° F., extra salt was added to the mud on subsequent wells to provide this excess for a saturated salt-water (130° F.) emulsion mud used in drilling well C shown in Fig. 3. Drilling and mud records are shown in Table 7. The caliper log from well C in Fig. 3 showed no enlargements of the hole through the salt beds penetrated which is the ultimate result desired in an effort to eliminate the problem of collapsed casing opposite these formations.

The saturated salt-water (130° F.) emulsion mud not only appears to prevent enlargement of the salt beds penetrated but the shale sections as well. No reduction of drilling rate has been observed using this mud.

Valuable source of salt . . . About 80 per cent of the increased cost of this mud from commercial additives is attributed to the salt. It should be noted that a good portion of the total salt required is in the salt water which is added to the mud for makeup purposes and obtained from producing wells in the area. The disposal of this salt water has heretofore been a disposal problem here. If this disposal water becomes unavailable due to exceeding supply, excessive hauling distances, etc., additional sacked salt will have to be used to offset this source of supply.

It has been observed that considerably more salt is being used than theoretically required to maintain the proper degree of saturation. This results from the use of coarsely ground salt which settles out badly or is removed by the shale shaker. Development of a more finely ground salt for maintenance purposes will solve the problem of keeping all the salt in suspension.

TABLE 6—WELL B—SATURATED SALT WATER (80° F.) EMULSION MUD

Days drilling	16
Feet drilled (5,900-8,300)	2,400
Properties of Mud	
Density, lb./gal.	10.8 to 11.1
Vis., sec. A.P.I.	50 to 60
Vis., cp.	55 to 65
Init. gel, g.	0
10-min. gel, g.	0 to 15
pH	6.8 to 7.2
Sand content, % by vol.	1.5
Water content, % by vol.	65
Oil content, % by vol.	10 to 12
Salt content, lb./bbl.	80
Salt content needed for 130° F. saturation, lb./bbl.	85
Fluid loss, A.P.I.	6 to 10
Properties of Filtrate	
Preservative, lb./bbl.	0.1 to 0.15
Ca, equiv. per M.M.	150 to 200
Mg, equiv. per M.M.	6 to 7
Cl, p.p.m.	187,000 to 194,500
Cl as NaCl, p.p.m.	308,000 to 321,000
SO_4, equiv. per M.M.	60 to 80
OH, equiv. per M.M.	0
CO_3, equiv. per M.M.	0
HCO_3, equiv. per M.M.	3 to 4
Materials required to prepare and maintain the saturated salt water (80° F.) emulsion mud.	
Salt water, bbl.	1,300
Ca, equiv. per M.M.	460
Mg, equiv. per M.M.	5
Cl, p.p.m.	187,000
Cl as NaCl—308,000 p.p.m., or 120 lb. per bbl.	
SO_4, equiv. per M.M.	6
OH, equiv. per M.M.	0
CO_3, equiv. per M.M.	0
HCO_3, equiv. per M.M.	4
*Salt, lb.	160,000
Crude oil, bbl.	400
*Gypsum, lb.	3,000
*Pregelatinized starch, lb.	12,000
*Preservative, lb.	900
Salt-water gel, lb.	3,500
*Defoamer, lb.	675
*Calcium ligno-sulfate, lb.	4,000
*Cost at well	$6,600.00
†Cost per bbl.	$ 2.20
Cost per day	$ 412.00
Cost per foot (5,900-8,300)	$ 2.75

*Cost at well based only on specific products marked with an asterisk.

†Mud prepared includes volume at conversion and increase in volume from added mud materials and formation solids.

TABLE 7—WELL C—SATURATED SALT WATER (130° F.) EMULSION MUD

Days drilling	16
Feet drilled (5,900-8,300)	2,400
Properties of Mud	
Density, lb./gal.	10.9 to 11.2
Vis., sec. A.P.I.	50 to 60
Vis., cp.	55 to 65
Init. gel, g.	0
10-min. gel., g.	0 to 15
pH	6.8 to 7.2
Sand content, % by vol.	1.5
Water content, % by vol.	65
Oil content, % by vol.	10-12
Salt content, lb./bbl.	85
Salt content needed for 130° F. saturation, lb./bbl.	85
Fluid loss, A.P.I.	6 to 10
Properties of Filtrate	
Preservative, lb./bbl.	0.1 to 0.15
Ca, equiv. per M.M.	200 to 250
Mg, equiv. per M.M.	6 to 7
Cl, p.p.m.	187,000 to 194,500
Cl as NaCl, p.p.m.	308,000 to 321,000
SO_4, equiv. per M.M.	30 to 50
OH, equiv. per M.M.	0
CO_3, equiv. per MM.	0
HCO_3, equiv. per M.M.	4 to 5
Materials required to prepare and maintain the saturated salt water (130° F.) emulsion mud.	
Salt water, bbl.	1,300
*Salt, lb.	180,000
Crude oil, bbl.	400
*Gypsum, lb.	3,000
*Pregelatinized starch, lb.	12,000
*Preservative, lb.	900
*Salt-water clay, lb.	3,500
*Defoamer, lb.	675
*Calcium ligno-sulfate, lb.	4,000
*Cost at well	$7,000.00
†Cost per bbl.	$ 2.34
Cost per day	$ 438.00
Cost per foot (5,900-8,300)	$ 2.83

*Cost at well based only on specific products marked with an asterisk.

†Mud prepared includes volume at conversion and increase in volume from added mud materials and formation solids.

Mud will solve problem . . . Saturated salt-water-emulsion mud has proved to be satisfactory for drilling the salt beds in the Spearfish and Charles without dissolving them, provided sufficient salt (both dissolved and suspended) is maintained in the muds to completely saturate the water phase at the mud temperature opposite the salt beds. Saturated salt-water-emulsion mud is considerably more expensive than the gyp-base muds that have been used, but this extra cost will be offset many times by the expected savings to be realized if the resulting in-gage holes through the salt beds eliminates the problem associated with collapsed casing.

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In Gulf Coast Drilling . . .

Low-Solids Mud Prevents Hole Trouble

by F. L. Gaye

WHEN applying sodium carboxymethylcellulose (CMC) to a system of drilling fluid it has been much easier to observe the results than to explain them. However, the most important chemical and physical properties are its viscosity and thixotropic behavior in aqueous solutions. Unfortunately, the exact measurement of these properties is quite difficult, since the product forms a colloidal suspension, not actually a solution.

This superior behavior of CMC has made it possible to suspend high-specific-gravity solids in a mud system with a much lower concentration of a colloidal suspension. Its plastering and adhering ability has made it highly desirable for wall building in a well bore. Its detergency-improving ability has tended to stabilize the dispersion of a system and makes it applicable as an emulsifying agent.

Author is engineer with Sunray Oil Corp., Rayne, La.

Elements of drilling fluid . . . In order properly to discuss CMC it is necessary to be oriented to some of the fundamental elements involved in drilling fluid. A drilling fluid primarily consists of two distinct phases, the liquid phase and the solid phase. The liquid phase is composed principally of water and whatever chemical that has been placed into solution, and, in many cases, oil in emulsion form. The solid phase normally consists of two supplementary phases. These are referred to as the low-specific-gravity solids and the high-specific-gravity solids.

The concentration of native clays, bentonitic shales, and refined bentonite constitutes the low-specific-gravity solids. The specific gravity of these solids ranges from approximately 1.8 to 2.5, and they exist in the system as an active colloidal suspension. Proper consideration for this particular phase of the system in many instances has meant the difference between success and failure of a mud system. The entire discussion of this report hinges around this phase of the system.

The concentration of barium sulfate constitutes the high-specific-gravity solids. The specific gravity of these solids ranges around 4.3, and they exist in the system as inert particles. Their contribution to the system is increased density only.

Water as drilling fluid . . . If it were possible to restrict a mud system to a water phase only (no solids), it would then be possible to eliminate all chemical treatment. Chemical is required only to disperse or deflocculate the low-specific-gravity solids. As the concentration of these solids increases with the resultant viscosity increase, so does the amount of chemical required properly to disperse these solids to obtain a viscosity decrease. A point of low-specific-gravity solids concentration can possibly be reached where no amount of chemical would be effective.

With water as a drilling fluid containing no solids, the danger of contamination and the resultant effect from sodium or calcium salts in the formations would be eliminated. This would eliminate the requirement of chemical to deflocculate the low-gravity solids after contamination. Water would also create more turbulent flow especially at the bit, and at a given pressure would increase bit nozzle velocity. These two factors have been recognized as aids to increasing rate of penetration. With

The author says . . .

1. Water possesses some highly desirable characteristics for drilling fluid, but it rapidly loses these features with increased concentrations of low-specific-gravity solids.

2. By substituting a small concentration of sodium carboxymethylcellulose (CMC) for a high concentration of low-specific-gravity solids, it is possible to approach more nearly the desirable characteristics of clear water and still maintain the required characteristics not satisfied by water.

3. Low-solid muds are a definite aid toward reducing the chances for lost circulation and blowouts.

4. The advantages of low-solid muds increase in importance as required mud weight increases.

5. Sodium carboxymethylcellulose has a property not possessed by starch that enables the suspension of high concentrations of weight material with small concentration of bentonite and clays. CMC is not limited to a high pH mud, as is starch. Moreover, starch requires preservatives which are extremely expensive.

6. Comparison of water-loss-reducing abilities of CMC and starch in a lime-base mud should be tempered with proper consideration for the wall-cake characteristics and resulting hole conditions under actual drilling.

7. If definite and equal volumes of water-loss reduction (A.P.I.) are the only consideration, then it is possible to justify 75 per cent of the unit cost of CMC in the normal range of water losses (A.P.I.). However, when considering CMC as the dual-purpose product that it is, its additional functions more than justify the additional 25 per cent of the unit cost. These additional functions of CMC are the real purpose and intent of its use.

8. Interpretations from the standard A.P.I. mud-testing procedures should be based on the known composition of the mud system. As this composition is altered, then new field experience is necessary to establish proper interpretation.

9. The primary aim of a proper sodium carboxymethylcellulose application is not necessarily to cut mud costs but to provide the most ideal drilling fluid possible with a minimum of cost. Many field examples have indicated, however, that it is possible to maintain this type system as a lower cost due to the lack of difficulty experienced.

high enough fluid velocity in the hole it could be possible to keep the hole clean of cuttings even with clear water as a medium. Clear water would tend to dissipate the heat from the bit more efficiently and would cool faster at the surface. Water would rapidly release any concentration of gas.

However, there are certain requirements and conditions of a mud system that water cannot satisfy. Water has insufficient density to offset formation pressures encountered in most drilling. It does not possess the ability to wall up the bore and protect it. Even though it would dissipate heat more efficiently, it does not have good lubricating value, which should result in more heat to be dissipated from bit friction. Some turbulent flow up the hole is desirable, as it will reduce the tendency of cuttings to fall out; in laminar flow these cuttings can accumulate in washout sections while circulating. Then, when circulation is ceased, the cuttings can fall back into the hole around the drill pipe, possibly wedging the pipe. However, with clear water, the turbulence can be prohibitive in many areas, due to the high velocity required to carry the cuttings; a washing action would be created which would tend to destroy the wall.

Introducing solids . . . In order to satisfy the conditions that are not met by water, it becomes necessary to introduce a solid phase into the system. For higher density to offset formation pressures, barium sulfate is introduced. This presents a suspension problem. Water does not possess the ability to suspend the barium sulphate particles, so it becomes necessary to introduce to the system another type of solid which, when sufficiently concentrated, will lend the system the thixotropic properties necessary for weight-suspension ability. This solid has been bentonite.

Bentonite, when sufficiently concentrated, also improves the system wall building, water-loss reduction, and lubricating qualities. However, as the concentration of this solid is increased to acquire the desired characteristics, the system rapidly loses the advantages of clear water and requires chemical treatment to disperse the solids. With very little drilling, additional native clay and shale solids will be dispersed into the system as a colloidal suspension and will require continued chemical treatment in increasing amounts in order to maintain a functionable system. In other words, by the time enough bentonite has been concentrated into the system to satisfy the characteristic requirements, the maximum concentration of solids before chemical treatment has been surpassed, and the system has no further tolerance for solids without increased chemical dispersion. A point is then rapidly reached where no increased amount of chemical will allow further clay concentration.

It is reasonable to assume that the nearer an approach can be made to the condition of clear water and still satisfy all the conditions, the more desirable the situation becomes. That is to say, the lower the concentration of low-specific-gravity solids in a system which satisfies the requirements, the more desirable the system becomes from all standpoints.

Introducing CMC . . . This brings us to the application of CMC instead of an extremely high concentration of low-specific-gravity solids to satisfy wall-cake characteristics, water-loss reduction, and weight-material-suspension abilities. It has been possible to accomplish the same purpose with a low concentration of low-specific-gravity solids and a small concentration of CMC. This has resulted in a mud with clay concentration far below the point where chemical maintenance is required, and a system which possesses a large tolerance for native solids before this point is reached.

With this large liquid phase the tolerance for any type of contamination is increased, and more calcium or sodium salts can be placed into the system on a pound per barrel basis before concentration of undesirable and damaging limits are reached. It has been possible to use water and prevent a too rapid buildup of native solids without excessive additions of CMC to maintain the characteristics.

Lost circulation, blowouts . . . In areas where lost circulation is a problem, it has been extremely important to maintain a minimum concentration of low-specific-gravity solids. As this concentration increases and the system becomes less fluid, the resistance to normal circulation in the hole increases and results in increased back pressure on the formation. This high circulation pressure may be sufficient to break down the formation and create a zone of lost circulation. The same high-solid condition also requires a slower movement of the drill pipe to reduce the downward pressure surges while running in the hole. Otherwise, chances of a formation breakdown would be aggravated.

Moreover, a slower pipe movement is necessary while coming out of the hole containing a viscous drilling fluid. This is because upward pressure surges may momentarily reduce the mud hydrostatic head sufficiently to allow gas from an exposed formation to bleed into the well with each stand. If enough gas is allowed to bleed in by this manner, it is possible that a blowout condition could result.

Initiating circulation with the mud pump becomes more of a problem as the concentration of solids is increased. The higher this concentration, the slower the mud circulation must be resumed in order to reduce the chances for a formation breakdown. The higher the solid concentration, the less rapidly gas will work out of the mud system.

Low solids and high weight . . . The higher the required mud weight, the more acute the problem of low-specific-gravity solids has become. From necessity for high weight there must be a high concentration of high-specific-gravity solids, which essentially reduces the tolerance for low-specific-gravity clays and bentonite. CMC has made it possible to suspend these high-weight muds with a minimum concentration of these clays.

Sodium Carboxymethylcellulose vs. Starch

Suspension, water loss . . . Where CMC is used for water-loss reduction only, without regard for the low-specific-gravity solid concentration, it is misused and can prove extremely costly. Water loss reduction is secondary to the real purpose and intent of a CMC application. Many laboratory tests have been conducted with CMC and starch for comparison where it is possible to use starch. The use of starch is restricted to high-pH systems, particularly lime-base muds where additives are not required to eliminate fermentation. CMC may be applied in any system without regard for the pH. These laboratory tests have in most cases been limited to comparative water-loss-reducing-ability tests. Starch has not aided materially in suspending weight material without the normal concentration of clays.

The comparative water-loss-reduction ability between CMC and starch depends upon the range of water loss being concerned. In the higher water-loss ranges (50 to 20 cc. A.P.I.) CMC has been found to be as high as 10 times as effective as starch. Within the medium range of water loss (20 to 8 cc. A.P.I.) CMC may be said to be approximately four times as effective as starch. Within the lower range of water loss the comparison drops off rapidly, and in some cases might be considered even.

However, field experience has indicated that comparative, if not superior, results have been obtained from a standpoint of hole condition and wall-cake characteristics with a range of water loss (A.P.I. filter test) from 6 to

8 cc. resulting from an application of CMC, compared to a range of water loss from 3 to 6 cc. (A.P.I. filter test) resulting from an application of starch. The A.P.I. filter test alone has by no means been absolutely indicative of results under actual drilling conditions. Less emphasis has been placed upon the exact volume of fluid obtained from an A.P.I. filter test and more consideration has been given to hole conditions and wall-cake characteristics.

It follows also that the actual fluid loss to the formations is governed much more by the wall-cake characteristics than by the fluid loss in cubic centimeters on an A.P.I. filter press. It is possible to have more actual fluid lost to the formation from a low-water-loss mud (A.P.I. test) than from a somewhat higher water-loss mud (A.P.I. test) due to the difference in wall-cake characteristics of the two muds. These considerations would alter the interpretation of the comparative water-loss-reducing abilities of CMC and starch, when based upon A.P.I. filter tests.

Economics . . . Projected into economics, and assuming a comparison of four to one, it would require starch in the amount of four times the amount of CMC to lower the water loss the same amount (A.P.I. filter test). Based on this, it is possible to justify 75 per cent of the unit cost of CMC with its water-loss-reducing ability. This leaves only 25 per cent of the unit cost of CMC to be justified by its most important function.

Diagnosing test results . . . Experience alone has indicated which characteristics reflected by A.P.I. mud-testing procedures are desirable and which are undesirable. Past experience can indicate this only as long as the composition of the mud remains constant. When the composition is changed, then new experience is necessary to indicate what constitutes desirable and undesirable characteristics.

Experience is necessary to interpret properly the results obtained from standard A.P.I. testing procedures when applied to a CMC treated mud. This is especially true with regard to gel strengths. A mud with a fair concentration of CMC presents a gel strength recording to the A.P.I. testing equipment, which could be considered undesirable if it were a bentonite mud. Were it a bentonite mud, the gel strength could be from high solids or contamination, and in either case most likely would be a progressive gel.

In this case, the 10-minute recording of the gel strength (A.P.I.) may not be a good indication of the pressure required to shear the mud after several hours. The gel strength due to CMC has been found to be a less progressive gel and has never developed to such a point as to make it difficult or impossible to break circulation after several static hours. This type of gel strength has been both desirable and beneficial, since it has not prevented gas from dissipating itself from the system.

Field Experience, Costs

There are several field examples where the application of CMC in low-solid muds has resulted in mud-cost figures actually lower than costs on comparable surrounding wells where low-solid CMC muds were not used. A part of this lower cost can be attributed to the lack of lost-circulation problems. The contention is that application of low-solid muds has helped reduce the lost-circulation problems in one highly critical area to such an extent that it has been necessary to resort to lost-circulation material only on one of the 12 wells drilled in the area to date. The total expenditure for mud to drill these 12 wells amounts to approximately $261,000. Included in this is only $2,400 for lost-circulation material. This represents 0.9 per cent of the total expenditure for mud and is unusual for Louisiana Gulf Coast drilling where lost circulation is one of the most important factors contributing to high mud costs. There are numerous incidents of stuck drill pipe in this same area, and to date there has never been a case of stuck drill pipe on any of these 12 wells.

In South Texas . . . Recent drilling of three deep wells in South Texas presented problems of severe lost circulation, bad hole conditions, and stuck drill pipe. Some CMC was used in two of these holes, but was introduced too late, and in insufficient quantity, and without the proper consideration for solids. The proper time to introduce CMC is with the initial mud conditioning when regular chemical maintenance is started, and before weighting up is begun, and then not until the low-specific-gravity solids have been sufficiently reduced.

If it is delayed until after difficulty develops and the mud has been weighted up, then it becomes a much more expensive operation to reduce sufficiently the low-specific-gravity solids by dilution with water. This delayed expensive process is difficult to justify due to the inability to predict the amount of difficulty that might follow by not going to this extreme measure. It can never be proved that omission or reduction of further trouble was due solely to the mud conditioning process.

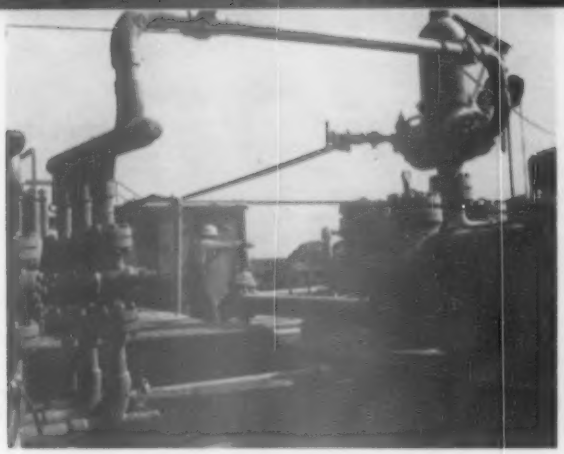
The fourth well in this area was drilled with a low-solid, CMC, low-pH mud to the protective casing point, at which time this system was displaced and stored; and, upon completion of the well was used to displace the lime-base mud and left behind the tubing in an attempt to combat high-temperature solidification. Three hundred barrels of lime-base mud was moved from the previous job and diluted with 500 bbl. of water and conditioned with CMC. This provided an entire system of low-solid lime-base mud with which the hole was carried to total depth without any lost circulation, bad hole conditions, or stuck drill pipe. These two complete systems cost approximately 8 per cent, or $2,000, more than the one system used on the third well, and this third well was the cheapest cost in the field.

In Mississippi . . . In an area in Mississippi where the average mud cost for that area was $2,500, and where low-weight lost circulation and stuck drill pipe were a common occurrence, a well was drilled for approximately $2,700 by applying low-solid CMC mud. This cost included $1,125 for Driscose. This was the only low-solid CMC mud that had been used in that area, and again there was no evidence of bad hole condition, lost circulation, or stuck drill pipe. Several diamond cores were cut in this well.

This was a good example of a high-solid mud that indicated zero gel strengths (A.P.I.) and had allowed a gradual increase of gas units recorded by a mud-logging truck. After diluting the solids and conditioning with CMC, the mud indicated a normally undesirable gel strength (A.P.I.). However, the gas readings in the logging unit reduced to zero and no further accumulation of gas occurred. After trips, circulation of this same mud was resumed with 200 psi. pump pressure.

South Louisiana . . . A low-solid CMC mud contributed largely to the successful drilling and completing of an extremely critical well in South Louisiana. The reservoir pressure of this well was 8,468 psi. at approximately 9,900 ft., which presents a difficult problem even under the most ideal circumstances. One incident of partial loss of circulation occurred and a very small concentration of lost-circulation material was used. The mud costs were by no means abnormal; in fact, they were extremely low considering the results.

In another South Louisiana area where considerable difficulty from both lost circulation and stuck drill pipe was experienced on previous wells, a well was drilled using a CMC low-solid lime base with no incidence of lost circulation or stuck drill pipe.



Here's a

Nonfluorescing Emulsion Drilling Fluid

. . . that doesn't interfere with examination of cuttings and cores

by D. L. Wilson

A NEW nonfluorescing emulsion drilling fluid is now available which meets all the requirements of a conventional emulsion drilling fluid but which does not interfere with interpretation of core samples and bit cuttings under the ultraviolet light. To accomplish this, both the oil and the emulsifier are nonfluorescent and remain so in the emulsion under conditions of use.

The nonfluorescing oil is emulsified with a conventional, oil-free, water-base drilling fluid by means of agitation with a suitable emulsifier. It then produces a nonfluorescent emulsion drilling fluid which does not quench, depress, mask, or alter the fluorescence of cuttings or core sections from an oil zone when these are examined under ultraviolet light ranging from 2,600-3,700 A. units, using techniques employed by petroleum geologists and core analysts. The oil remains colorless under the conditions of use, hence it does not impart "cut," color, or fluorescence which could be interpreted as a showing of crude oil.

The nonfluorescing oil may be spotted in an exploratory well to release stuck drill pipe with no danger of affecting formation evaluation. This application has been used successfully in the field, and conclusions based on extensive laboratory experiments by a major operator indicate that a fairly high-gravity refined oil should be considerably more effective for this purpose than either crude oil or lower-gravity refined oils. It naturally follows that an oil of the above-mentioned type which is also nonfluorescing would be ideal for the purpose.

Author is director of research, Oil Base, Inc., Compton, Calif.

During its experimental development, the oil was used on a number of carefully selected jobs to subject it to a wide range of operating conditions and geographical locations in California, West Texas, East Texas, Texas Gulf Coast, Louisiana Gulf Coast (in the second deepest producing well), Venezuela, and Colombia. Recently, an important new discovery in California using a nonfluorescent emulsion drilling fluid was attributed to the well-logging unit.

What is fluorescence? . . . Fluorescence is a function of molecular structure, and is closely related to ultraviolet absorption; part of the energy absorbed on exposure to ultraviolet light is reemitted as light in the visible wave-length region. Among the hydrocarbons the effect is most pronounced in the aromatic compounds and increases strongly with the number of condensed rings per molecule. Monocyclic derivatives are slightly fluorescent, bicyclic derivatives have pronounced fluorescence, while polycyclics with three or more rings are intensely active.

Molecular structure also determines color; the appearance and progressive increase of color in an initially colorless, or very nearly so, oil when subjected to higher temperatures is due to the formation of colored complexes through oxidation, polymerization, and resinification of chemically reactive and unstable hydrocarbons such as diolefins, cyclic olefins, simple olefins, aromatics, and sulfur compounds.

Drastic refining methods will remove all the unstable and reactive hydrocarbons, leaving only the stable paraffins and naphthenes, which are colorless and nonfluorescent. Synthesis of hydrocarbons which contain no aromatics or unsaturates provides oils which are nonfluorescent and remain so under the conditions of use.

How fluorescence is used . . . In the early 1930's it was discovered that exposure of a core section or bit cuttings to ultraviolet light within the range of 2,600-3,700 A. units would induce fluorescence if crude oil, including condensate or distillate, were present. Further, if the core fragments or cuttings were shaken with petroleum ether or carbon tetrachloride any crude oils or condensates were extracted from the solids and recognized by the color (cut, stain), also by fluorescence under the ultraviolet light.

Obviously, contamination of the core, or cuttings, by oil from an extraneous source, characterized by fluorescence and color, would give a petroleum ether coloration or "cut." Now, since these tests are utilized to locate the potentially productive oil zones in a wildcat well, it is essential that the tests be thoroughly reliable, for erroneous conclusions from misleading data could lead to costly testing in zones which are nonproductive.

The first emulsion drilling fluid was

used in 1943. The main object was to improve the mechanical performance of the drilling mud, and this was achieved with marked success. It was not long, however, before the people concerned with interpretation of drill cuttings and core samples complained that the fluorescent oil from the emulsion drilling fluid contaminated the cores and drill cuttings so that valid interpretations were very difficult, if not impossible, in exploratory wells. The situation was further complicated by fluorescent emulsifiers.

Some people contend that diesel oil may be safely used in exploratory wells. However, condensate and distillate pay zones are easy to overlook unless fluorescent examination is used; and condensates and distillates are characterized by a bluish-white or yellowish-white fluorescence which cannot be distinguished from that of diesel oil, kerosines, gas oils, and other kinds of refined oils. Further, under the conditions of use the polymerizable constituents of a diesel oil react to form molecular complexes which impart fluorescence very similar to many crudes—this condition increases with time and temperature.

Oil Base, Inc., began working several years ago to develop a nonfluorescing emulsion drilling fluid which would meet all the requirements of a conventional emulsion drilling fluid but would not interfere with interpretation of core samples and bit cuttings under the ultraviolet light. The company has recently been granted a patent on this work, and plans to license oil companies to use their own, or other, nonfluorescing oils on a nonexclusive, nominal-royalty basis.

Reported here are the results of efforts that began several years ago to "develop a nonfluorescing emulsion drilling fluid which would meet all the requirements of a conventional drilling fluid but would not interfere with interpretation of core samples and bit cuttings under the ultraviolet light."

Field Results

Following are some brief field reports of jobs recently completed using the nonfluorescing oil, which is called No-Glo.

Pico Canyon area, California . . . One of the first wells on which the new nonfluorescing oil was used was in Pico Canyon area of California.

Prior to addition of the oil to this mud system, hole trouble was experienced each time a trip was made. Hydratable shale excessively wetted by the mud filtrate caused difficulty in pulling and running pipe, and this tight-hole condition became more pronounced with each trip. The mud at this point was a chemically treated low-pH clay base. Average mud characteristics were as follows: weight—81 lb. per cu. ft.; viscosity—50 seconds; filter loss—6.3 cc. per 30 minutes.

Since it was evident that a lower filtrate loss was needed to eliminate the hole trouble and permit drilling operations to continue, the operator decided to go to an emulsion-type mud. However, the well was a wildcat, and a fluid logging unit was continuously logging the hole penetrated; so if a fluorescent type of oil were added to the mud system, accurate log interpretations would be difficult. These conditions resulted in the operator deciding to test the nonfluorescing oil and emulsifier.

Initial treatment was added when depth of hole was 6,536 ft., and the total volume of the system was approximately 850 bbl. Concentrations of oil and emulsifier for this initial treatment were 14 per cent and 10 lb. per barrel, respectively, and 175 sacks of weight material was added to maintain the weight while adding the oil. Resulting mud characteristics following this treatment were as follows: Weight, 80 lb. per cu. ft.; viscosity, 42 seconds; and filter loss, 2.9 cc. per 30 minutes.

The first trip out of the hole after the above treatment was troublefree, but for the first few days 10 to 15 ft. of reaming was required to get back to bottom. The amount of reaming became less and less with each new bit run, and after about 5 days, the hole cleaned up completely.

The stability of the nonfluorescing material was particularly indicated during the first few weeks of this job. No further oil or emulsifier additions were made to the system for 15 days from the initial treatment, and even though the system was diluted with daily treatments of 25 to 50 bbl. of chemically treated water and bentonite to replace lost fluid, the mud characteristics at this point were still very good. The filter loss had increased to 4.4 cc. per 30 minutes so another treatment of 50 bbl. of oil and 32 sacks of emulsifier was added to the now 900-bbl. system reducing the filter loss to 3.2 cc. When the filtrate loss began approaching the operator's specified maximum of 4 cc. per 30 minutes, 5 days after the second treatment, a daily treatment was started, by adding 5 bbl. of the oil and 2 sacks of the emulsifier to the above-mentioned clay-water pill. During normal drilling operations this daily treatment held the filter loss at an average of 3.8 cc. per 30 minutes, and the oil concentration of the system remained between 6 and 8 per cent. It should be particularly noted here that the daily addition of oil and emulsifier was necessary to partially offset the dilution of the system by the clay-water pills added to maintain sufficient volume, and yet the oil concentration and filter loss hardly varied from day to day.

At one stage of this job there was a 10-day shutdown for rig repairs. After 10 days out of the hole, they went right to bottom with no reaming or cleaning out and started making hole. After one circulation, the mud was in very good shape with only a slight increase in water loss over the value prior to shutting down.

Toward the end of this job there was considerable cementing and drilling of cement done. At one joint they drilled out 150 ft. of cement plug without treating the mud. Due to lack of treatment, the water loss increased considerably and the troublesome shale started running again. As soon as the mud was again treated with the oil and emulsifier, the shale condition cleared up and gave no further trouble.

Of this particular job in which the over-all average mud volume was 1,000 bbl., a concentration of 6 to 10 per cent nonfluorescing oil and approximately 1 lb. per bbl. of nonfluorescing emulsifier to each 1 per cent of oil seemed most effective in holding the mud properties to the operator's specifications. The above concentrations were certainly not difficult to maintain; and in a system where normal mud loss is less or there is a smaller volume of mud to treat, the oil concentration and desirable filtrate properties should be much easier and cheaper to maintain. For this particular job it was learned that the mud specifications were easier to hold by going to a daily treatment of small concentrations after the initial treatment than by using larger one-shot treatments every few days.

Tight emulsification of the oil phase was indicated by the absence of the "rainbow effect" on the mud surface. This effect is due to free oil which may result from: (1) poor emulsifier, (2) incomplete emulsification, or (3) escape tendency of light fractions from a crude-oil emulsion. Thus, to avoid the rainbow effect on the mud surface, it is necessary to use an emulsifier which will retain its effectiveness in the pres-

ence of contaminants such as cement, anhydrite, brines, calcium, and magnesium ions. Soap-type emulsifiers are chemically altered by these contaminants, minimizing or nullifying their emulsifying capacity, releasing free oil from the emulsion which accumulates on the mud surface. The new emulsifier and various lignite-type emulsifiers retain their emulsifying capacity in the presence of the contaminants mentioned.

Weeks Island . . . Shell Oil Co.-Gonsoulin-Minville-State Unit 2, Weeks Island field, Iberia Parish, Louisiana, was officially completed October 2, 1953, as the world's deepest commercial producer. Production is from perforations 17,260 to 17,306 ft. in a lower Miocene sand; 9⅝-in. casing was set in this well at 14,011 ft. While drilling at around 16,000 ft. tight-hole conditions and high torque developed. At 16,000 ft. the mud was emulsified with 15 per cent of the nonfluorescing oil by volume, and these conditions were satisfactorily cleared up within 24 hours. This well was drilled to a total depth of 18,568 ft. with no further hole trouble developing. No fluid logging unit was used on this well. There was no indication of false description of formation fluid content due to presence of the oil in the mud.

Bourg field . . . In a recent well in the Bourg field (offshore near Houma, La.), an emulsified mud with approximately 12 per cent of the nonfluorescing oil was used to drill from 15,000 ft. to total depth at 16,000 ft., where the well was dry and abandoned. A fluid-logging unit was on the job, and no hole trouble nor adverse mud properties were reported.

Mud Logging in Oil-Emulsion Mud

The nonfluorescing oil-emulsion mud presents minor problems in the logging of a well which require the attention of the logger. However, these factors, if properly considered, do not seriously impair the effectiveness of the logging.

The appearance of free oil in a mud-cutting mixture is reported to be different from that observed in a water-clay-base mud. In a recent well, one short interval was observed that contained what was believed to be live oil. Small live-oil droplets of ¼ to ½ mm. appeared in the sample. This is much smaller than the usual size of live-oil droplets in ditch samples from oil formations in water-clay-base mud. Coincidental with the appearance of these live-oil droplets, the curves of micro-gas in mud and gas in cuttings rose sharply. It seems likely that the oil encountered in drilling had, in part, gone into a solution with the emulsified droplets of No-Glo oil, and in addition, may have been partly emulsified by the emulsifier.

The fluorescence in this case was a faint, dark yellow, partly to greatly obscured by the bright blue fluorescence of partially dissolved (by the emulsion drilling fluid) pipe-thread dope. This fluorescence of the partially dissolved pipe-thread dope, when present in appreciable quantities (after a trip), was troublesome because of its masking effect on the darker fluorescing crude oil. A nonfluorescing thread dope is definitely advantageous for use with a nonfluorescing drilling fluid, and is commercially available.

Gas indications . . . The factors, micro-gas in mud and gas from cuttings, do not seem to be materially affected by this nonfluorescing mud. They, therefore, remain as very reliable indexes on hydrocarbon logs. Samples of the mud, when agitated in a blender, may release a small quantity of gas; but this gas reading usually remains fairly constant for the duration of the well, and so a working contamination level can easily be established.

Carbon tetrachloride cuts . . . Stained sandstone cuttings seem to yield carbon tetrachloride cuts of a slightly lower intensity than would be expected from the appearance of the sandstone. A considerably more intense cut can often be obtained by crushing the cuttings. Individual chips of sandstone might yield no cut until crushed. From this, it seems possible that some of the oil-wetted surface may have been leached by the emulsion fluid.

TABLE 1—FIELD DATA ON NON-FLUORESCING DRILLING FLUID

Type mud	Changeover: Before Clay-water	Changeover: After Oil emulsion
No-Glo oil, per cent	0	12
Emulsifier (lb. per bbl. emulsion)	0	8
Weight, lb. per gal.	10.8	*10.7
Weight, lb. per cu. ft.	80.7	*80.0
Viscosity:		
Marsh funnel seconds at 116° F.	51	42
Fann V-G meter, cp. at 116° F.	67	44
Gel strength:		
Fann V-G meter, grams at 116° F.		
Initial	12	1
10-minute	25	4
Fluid loss, cc., °A.P.I.	6.2	2.8
Filter cake, in.	3/32	2/32
pH	8.2	8.2
Fluorescence (as reported by well-logging unit)	None	None
Sand content, per cent	>5	<2

*Adjusted to 10.8 with barite.

BOOKS

TAXATION OF OIL AND GAS INCOME. By Clark W. Breeding, C.P.A., and A. Gordon Burton, C.A. Published by Prentice-Hall, Inc., 70 Fifth Avenue, New York 11. 340 pp., $5 (law school edition).

This book will fill a long-felt need among oil operators for detailed and up-to-the-minute information on this subject. First author is partner, Peat, Marwick, Mitchell & Co., Dallas; the second is partner in same firm at Calgary.

The treatise is well organized, opening with an introductry chapter on petroleum production and including basic principles of federal income taxation and the financing of exploration and development activities.

Chapter 2 deals with kinds of property interests. Next is classification of conveyances for federal tax purposes, and there follow four chapters on conveyances—leasing or subleasing transactions, sales or exchanges, anticipation of income, and sharing arrangements. Chapter 8 deals with ownership and operation of oil and gas properties; 9, with geological and geophysical costs; 10, intangible drilling and development costs; 11, depletion; 12, the property unit; 13, joint operation—co-ownership vs. partnership; 14, associations taxable as corporations; 15, unitization agreements; 16, special problems; and 17, Canadian income taxes.

The appendix includes U. S. Treasury Regulations, 1939 I.R.C. Sections, 1954 I.R.C. Sections, Canadian References, and Citations.

A.S.T.M. MANUAL ON INDUSTRIAL WATER, SECOND PRINTING. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. 430 pp.; 6 by 9, cloth binding, $5.

This manual, now in its second printing, offers a broad discussion on the nature and uses of industrial water, plus up-to-date test methods and specifications developed by leading authorities in the field. Eleven new test methods, eight revisions of existing methods, a complete table of contents, and a detailed index have been incorporated into the manual. Several proposed methods published as information have also been included.

New material includes 10 methods for: chemical oxygen demand (dichromate oxygen demand) of industrial waste water; chlorine requirement of industrial water and industrial waste water; in industrial water (residual chlorine—nitrate ion—sulfite ion); in industrial waste water (odor—oil matter—pH—sulfides); also determination of thickness of internal deposits on tabular heat-exchange surfaces; and a scheme for analysis of industrial water and industrial waste water.

This manual is intended as an authoritative reference source of information for three types of users: executives and plant designers; individuals engaged in industrial operations involving the use of water; and analysts, operators of special instruments, engineers, and consultants.

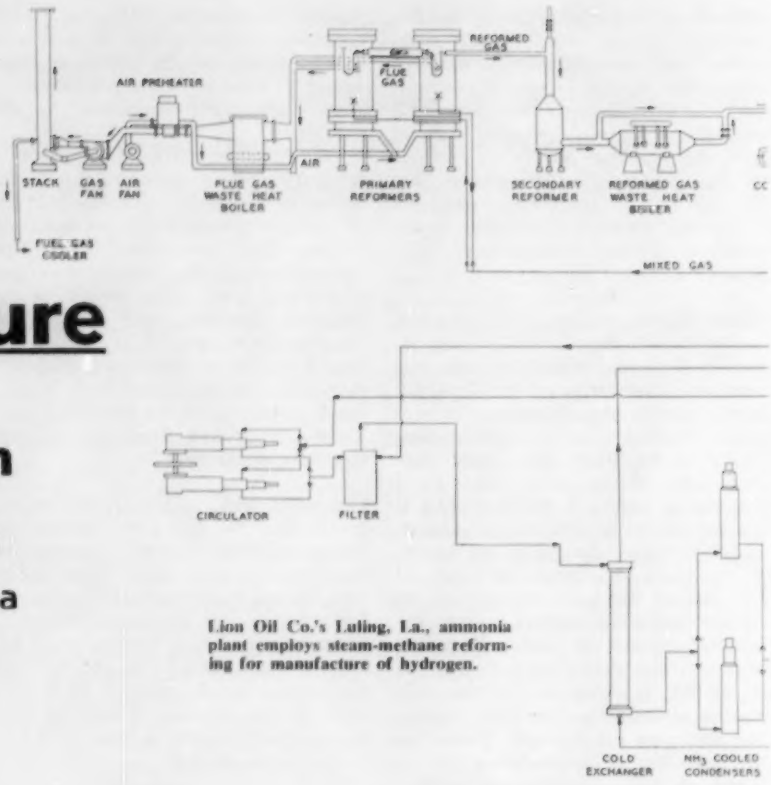
PURGING PRINCIPLES AND PRACTICE. Published by American Gas Association, 420 Lexington Ave., New York 17. 225 pages. A.G.A. members—$5 per copy ($4 each in lots of 10 or more); nonmembers $6 per copy ($5 each in lots of 10 or more); students $4 per copy.

This book was prepared by the section's purging committee under the chairmanship of G. R. King (Philadelphia Electric Co.) It includes 220 pages of text, charts, tables, illustrations, graphs, and bibliographies. Covered are such subjects as factors affecting the mechanical nature of purging; supervision, personnel and planning; isolation; sources of ignition; vent pipes, testing instruments and apparatus; and testing methods for control of purging.

Ammonia Manufacture

. . . 1954 version

Process improvements highlight new Louisiana plant of Lion Oil Co.



Lion Oil Co.'s Luling, La., ammonia plant employs steam-methane reforming for manufacture of hydrogen.

by F. Lawrence Resen
Gulf Coast District Editor

PLACING on stream of the 300-ton per day Lion Oil Co. Barton ammonia plant at Luling, La., last spring affords an interesting study of contrasts when comparisons are made with Lion's other plant at El Dorado, Ark.

Processwise, both plants are similar, using Chemical Construction Co.'s methane-steam method of reforming natural gas and then synthesizing hydrogen and nitrogen to ammonia product in the presence of catalyst. However, modifications to the process and the current concept in construction are indicative of strides made in processing since the war years.

Among the modifications which will be more fully discussed are the lube-oil-recovery facilities, the substitution of aqua ammonia for caustic wash in the purification section, and the recompression system used in storing ammonia. However, a quick glance will show some of these other aspects which highlight the new plant:

1. **Compactness.** With the exception of the ammonium nitrate units, plant facilities are concentrated in a smaller area than previously, making operations and maintenance more convenient.

2. **Compression.** Compressors of 2,500 hp. are used to handle the synthesis gas at Barton as opposed to 1,000-hp. units at El Dorado.

3. **Outdoor construction.** In keeping with trend in the semitropical climate of the Gulf Coast, plant is constructed outdoors with exception of compressor building and control rooms. This contrasts sharply with previous ammonia plants, where covered structures were used in most areas.

4. **Compressor efficiency.** Advantage is taken of gas pressure to pick up gas at 15-18 psig. in first stage of compression, thereby eliminating one of the stages necessary to boost gas to synthesis pressure of 5,200 lb.

5. **Ammonia refrigeration.** This is one of two plants using ammonia centrifugal compressors for ammonia refrigeration service. A small, compact unit does job formerly requiring bulky facilities.

6. **MEA scrubber.** Initially, CO_2 removal system at El Dorado used water scrubbers, which were then supplemented with a monoethanolamine system for more efficient removal of CO_2. This improved system was installed at Barton plant.

7. **Dual plant.** Two parallel trains with a total capacity of 150 tons each are used throughout the plant, providing insurance against total plant shutdowns during turnarounds and emergency repairs.

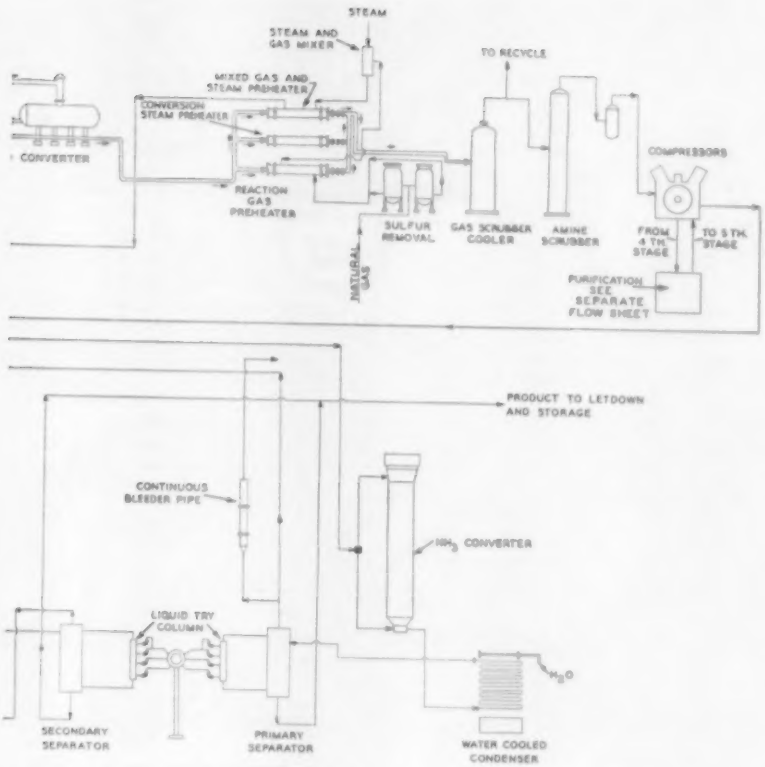
Process Description

Before amplifying on some of the modifications, it will be well to spend a short amount of time reviewing the process used at Barton for background information, although similar processes have previously been discussed *(The Oil and Gas Journal, July 12, 1951, page 76, and August 18, 1952, page 96).*

The plant receives natural gas with an approximate heating value of 1,000 B.t.u. per cu. ft. at standard temperature and pressure and uses this for both reaction gas and as fuel gas. Three main systems make up the process: gas reforming, where the methane is broken down into hydrogen and carbon components; compression, where the hydrogen and injected nitrogen are raised to the synthesis pressure; synthesis, where the gases are passed over a catalyst at proper temperature and pressure conditions to promote the reaction.

Reforming . . . Incoming natural gas is initially passed through vessels containing absorbent which removes hydrogen sulfide and organic sulfur from the stream before reforming. The gas is next preheated in the reaction gas preheater by heat exchange with hot converted gases from the CO converter.

Process steam to the primary reformers is mixed with the sulfur-free, preheated gas and the mixture passes through another preheater which raises the temperature to 750° F. The resultant mixture passes over catalyst in the primary reformer tubes where the



methane and steam are broken down to hydrogen, carbon monoxide, and carbon dioxide.

The catalyst is contained in long vertical, special-alloy stainless-steel tubes. These tubes are arranged in the cylindrical, refractory-lined combustion section of the furnaces, in two vertical planes on the diameter of the heater and intersecting at right angles. Natural gas, burned with preheated air, is used to fire the furnace. Leaving the tubes the reformed gas has a temperature of approximately 1,000° F., while the flue gases which surround the tubes leave the furnace at about 1,600° F.

Reformed gas containing about 5.0 per cent methane and steam leaves the reforming furnaces at approximately 25 psig. and enters the secondary reformer. This vessel contains catalyst similar to that in the primary reformer but it is arranged in a single bed. At the inlet of the secondary reformer sufficient air and flue gas are mixed with the incoming gas from the primary reformer to give the desired ratio of hydrogen to nitrogen in the product gas after CO conversion. A portion of the gas burns with air in the upper part of the secondary, resulting in a temperature of about 1,600° F. As the gases pass through the catalyst bed reactions similar to those occurring in the primary take place and result in lowering the CH_4 content of the exit gas to 0.4 per cent maximum.

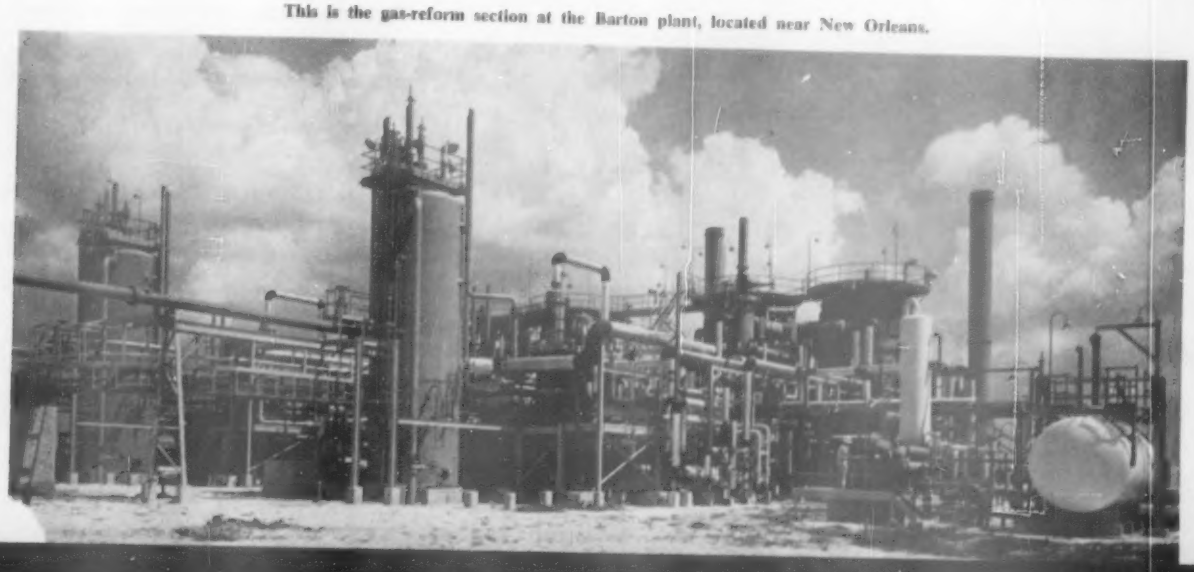
Leaving the secondary reformer, the gas is cooled to CO conversion temperature and then enters the CO converter which is charged with catalyst which promotes the water gas shift reaction, converting most of the CO to CO_2 and producing additional hydrogen. The gas is then cooled in several steps, finally being cooled by direct contact with water in the gas-scrubber cooler. Gas from here is then piped to the amine CO_2 removal plant where the bulk of the CO_2 is scrubbed out of the reformed gas.

Compression . . . There are six gas-engine-driven compressor units, each having five stages of compression. These are designed to compress a total of 26,280 cu. ft. per minute (measured dry at 0° C. and 760 mm. of Hg) of process gas from suction conditions of 15 psig., 100° F., saturated with water vapor, to a final pressure of 5,200 psig. Of this capacity, 21,000 cu. ft. per minute is the total required for the production of 300 tons of ammonia per day, with the additional amount being standby capacity.

Suction gas for the compressors is picked up from the amine CO_2 removal plant. There is no gas holder for taking the surge between the plant and the suction of the compressors, but the pressure on the suction line is maintained at approximately 15 psig. by control of the compressor speed and/or the rate of operation of the gas reform plant.

The suction gas is compressed through four stages of compression to approximately 2,000 psig. It is then discharged from the compressors and sent to a high-pressure purification plant where CO and residual CO_2 are removed by scrubbing. Gas leaving the high-pressure purification step returns to the compressors where it enters the

This is the gas-reform section at the Barton plant, located near New Orleans.



fifth stage suction and is compressed in one stage to a final pressure of approximately 5,200 psig., at which point it is discharged to the synthesis system.

Synthesis . . . The gas entering the synthesis system is termed makeup gas and contains about 5 p.p.m. CO_2, 10 p.p.m. CO, no oxygen, 0.3 per cent argon, 0.4 per cent methane, 74.5 per cent hydrogen, and 24.8 per cent nitrogen. This makeup gas, together with recycle gas, is passed through a filter to remove any entrained oil. The gases then pass through cooling units where part of the ammonia in the circulating gas is condensed to liquid ammonia and separated from the gas stream. The mist-free gas is sent on to the ammonia converter where the hydrogen and nitrogen combine to form ammonia. This takes place at about 940° F. and 5,000 psig. in the presence of a promoted ferric oxide catalyst.

Gases leaving the converter will have an ammonia content of about 13-14 per cent, whereas the ammonia content of the gases entering the converter will be about 3 per cent. The gases leaving the converter are sent to a water-cooled condenser and separator where about 50-60 per cent of the ammonia is condensed. The gases then pass to the circulator where gas pressure is increased from 4,700-5,200 psig. The gas from the circulator discharge passes to the filter where additional makeup gas is introduced and the cycle repeated. The increase in gas pressure is to overcome pressure drop through the system. Liquid ammonia removed in the separators is let down to about 250 psig. and piped to storage and shipping.

Process Highlights

Storage recompression . . . An interesting arrangement is provided at the storage and recovery section of the plant where provisions have been made for picking up vapors from the storage Hortonspheres, compressing and condensing them, and returning liquid ammonia to the spheres. The compressor used in this service is also used to blow down weighing and storage tanks and also for picking up vapors vented when loading tank cars. Other facilities are used to recover ammonia from the gas mixture bled from the weigh tanks and the synthesis units.

Low-pressure storage of anhydrous ammonia is available in four Hortonspheres, with a total capacity of 5,200 tons. These vessels are standard uninsulated spheres, with a design pressure of 75 psig. Plant operating conditions call for maintaining this pressure below design and to this end, vapors generated by ambient temperatures are charged to a Frick compressor for recovery. Discharge from the compressor passes through a knockout drum and then a condenser where the ammonia is liquefied. It is then pumped back to storage from a receiving drum. Thus, a closed system is used to maintain the desired pressure in the spheres without any loss of product.

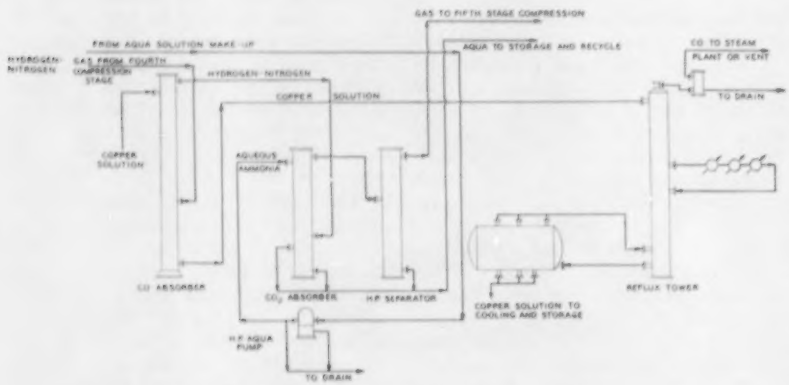
The recovery system compressor also serves the weighing tanks and tank-car loading platform. In the process, liquid ammonia is sent from the synthesis department to the letdown tanks where the product is weighed and most of the dissolved gases flashed off. After being weighed, the ammonia is piped to the ammonium nitrate weigh tank, to the nitric acid weigh tank, to the Hortonspheres, to the ammonia loading platform, or to the ammonia department for makeup. It is necessary at times to pressurize the tanks or empty them.

Discharge gases from the compressor are charged to any of the scale or storage tanks in the storage department or any of the ammonia evaporators in the ammonia department so they may be pressurized and blown down. Alternatively, suction may be taken from any one of the vessels to the compressor in order to evacuate the vessel. Ammonia vapor remaining in a vessel when its pressure has reached 60 psig. is vented to an absorber. Additionally, when loading a tank car with liquid ammonia, vapor from the car is vented back to the compressor and thus recovered without any loss.

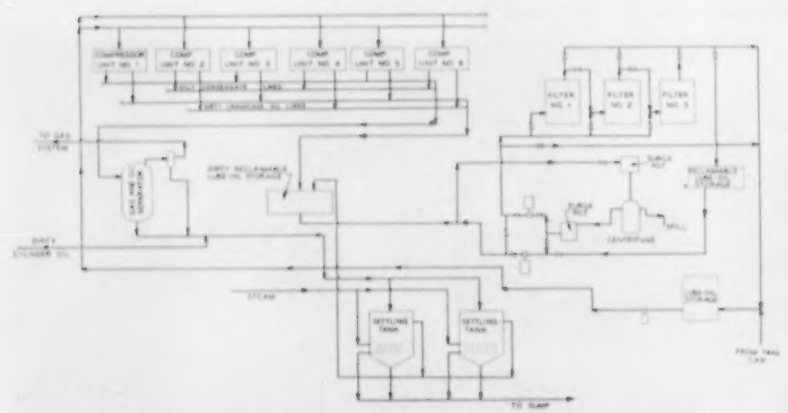
The recovery of vent gases and synthesis purge gas, meanwhile, is accomplished by use of an absorption tower in the recovery unit. Gases from the scale tanks and purges are charged to the tower. Here they come in contact with a condensate stream where the ammonia is absorbed to form a 30 per cent aqueous solution. The solution may be sold as such, or it may be distilled to recover the ammonia, which is then returned to storage.

Purification . . . An improvement in the purification section has been the use of aqua ammonia rather than caustic solution as a scrubber for removal of CO_2. In using this method, the ammonia represents not only a cheaper means but also is considerably easier to handle than caustic.

In the purification process, the discharge of the fourth stage of the gas compressors is a gas mixture, which consists, on the average, of hydrogen and nitrogen in the ratio of three to one, together with 0.2 per cent carbon dioxide, 2.4 per cent carbon monoxide, 0.4 per cent methane, and 0.3 per cent



Here is a simplified flow diagram of the high-pressure purification section.



How lube-oil reclamation is carried out at Lion's new ammonia plant.

NO "LOST CAPACITY"

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All Horton® Floating Roofs are equipped with the Horton Seal . . . the best seal ever devised to prevent the loss of vapor between the deck of a floating roof and the shell of a tank. Note the sealing ring extending above the tank shell in the view above. The tank is filled to absolute capacity but the Horton Seal continues to operate efficiently and will return to the tank safely and easily when the liquid level is lowered. There is no lost capacity in this tank . . . and no unnecessary loss of air-vapor mixture either.

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Top View: 55,000-bbl. tanks equipped with Horton Double-Deck Floating Roofs. They are located at a California refinery.

Above: Looking into a tank equipped with a Horton Double-Deck Floating Roof.

CHICAGO BRIDGE & IRON COMPANY

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Birmingham, 1	1536 North 50th St.	Houston, 2	2119 C & I Life Bldg.	Salt Lake City, 4	525 West 17th South St.
Boston, 10	1025—201 Devonshire St.	Los Angeles, 17	1523 General Petroleum Bldg.	San Francisco, 4	1554—200 Bush St.
Chicago, 4	2128 McCormick Bldg.	New York, 6	3347—165 Broadway Bldg.	Seattle, 1	1325 Henry Bldg.
Cleveland, 15	2204 Midland Bldg.	Philadelphia, 3	1615—1700 Walnut Street Bldg.	Tulsa, 3	1606 Hunt Bldg.

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argon. All of the gases except the two synthesis gases may be considered impurities either because they are catalyst poisons or because their presence reduces the effectiveness of the hydrogen-nitrogen pressure. Further, CO_2 may form ammonium carbamate or carbonate, which may plug the synthesis process lines.

Output of the compressors, at a normal operating pressure of 2,000 psig. is taken through two separate headers to two parallel purification trains. In each train, the gas is scrubbed by a stream of refrigerated copper liquor and its CO content thereby reduced to 5-10 p.p.m. and its CO_2 content to 50-60 p.p.m. The gas mixture leaving the copper liquid scrubber is then washed by a weak aqua ammonia stream in a bubble-cap tower—CO_2 absorber—and the CO_2 content further reduced to 5 p.p.m. or less. Gases leaving the absorber flow through a high-pressure separator and then to the fifth stage of compression.

Aqua ammonia leaving the absorber—or high-pressure scrubber—flows to an aqua ammonia solution letdown tank and from there to the aqua ammonia solution storage tank from which it is again pumped to the absorber. The aqua ammonia is recirculated until its absorption capacity has been considerably reduced and is then used for copper solution makeup or sent to sewer.

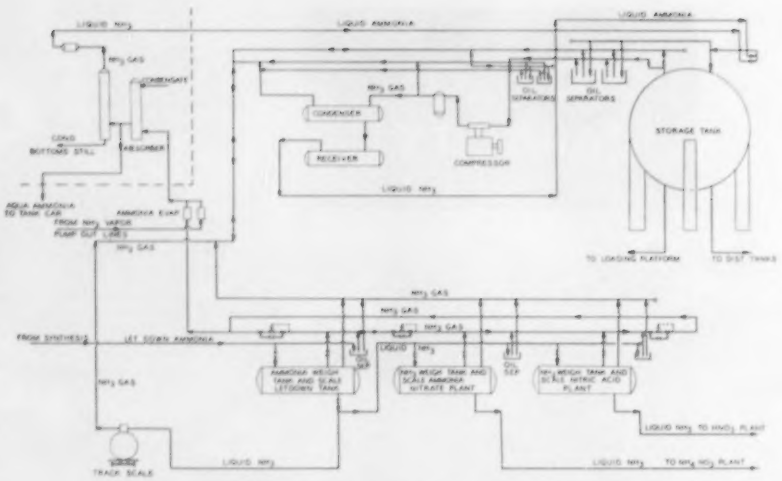
Copper liquor leaving the scrubber is sent to a regeneration unit, where absorbed gases are released by reduction of the pressure and heating the solution. The liquor is then cooled, refrigerated, filtered and pumped again to the copper liquor scrubber, with makeup added whenever necessary.

The copper liquor to be regenerated enters the regeneration unit at the top of the reflux tower where it falls through a ring-packed section onto a catch plate located at the middle of the tower. From here the liquor flows by gravity in series through the tube side of two heat exchangers and a steam heater, back into the lower portion of the reflux tower, where it falls through another ring-packed section and flows into the hot storage tank.

The absorbed gases which are evolved from the copper liquor during its passage through the heat exchangers and steam heater flow by means of a manifold from the exchangers and heater, back into the reflux tower, upward through the tower, and out through the water washer. The gases, containing principally CO, are washed with water in the water washer to remove ammonia and are used for plant fuel or vented.

Regenerated copper liquor solution is pumped from the hot storage tank by a low-pressure copper solution pump, through the shell side of the two copper solution heat exchangers, then through the water-cooled copper solution cooler and the ammonia cooled copper solution cooler where it is cooled to approximately 32° F. The cold regenerated copper liquor then passes through the filter for the high-pressure copper liquor pump to the suction of the pump which then feeds it to the scrubber.

A small quantity of copper liquor leaving the water cooler is diverted from the main liquor stream and passes through a side-stream filter back into the hot-storage tank. The cupric content of the liquor is controlled by adding air from the air compressor to the hot-storage tank or bottom of the reflux tower.



Storage recompression is provided in the ammonia recovery section.

Oil reclamation . . . The volume of lubricating oil used at the plant has been such as to warrant installation of an oil reclamation system for recovering much of the crankcase oil used in the many engines at the plant.

In short, the system consists of centrifuging and filtering the dirty crankcase oil and then recirculating it back to the engines. Necessary makeup oil is added at the storage tanks and a considerable savings is effected in this manner.

Initially, clean crankcase oil is pumped to a dual manifold feeding the six compressor units. Oil to the individual units is picked up from the manifold and added as necessary. Two streams are withdrawn from the compressor units, however, one being oil condensate and the other being dirty crankcase oil. These streams enter separate dual manifolds, where the 12 individual streams are finally combined into two separate streams.

The oily condensate stream is charged to a gas-condensate separator where gas is withdrawn overhead, passes into a final knockout drum, and is charged to the suction gas header. The liquid streams from the bottom of both the separator and knockout drum are combined and charged to two parallel settling tanks. They are commingled with a stream of dirty cylinder oil from the oil return pump prior to entering the tanks.

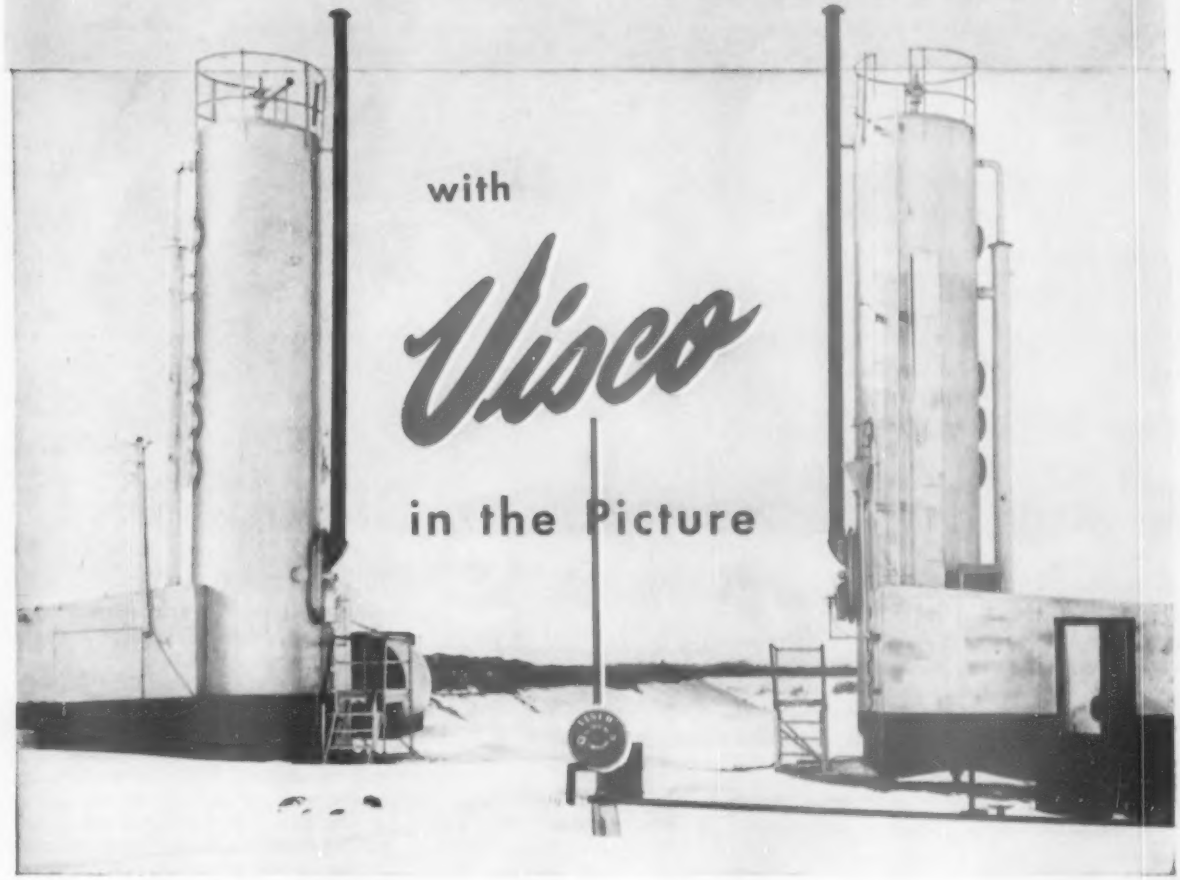
Steam coils are used in each tank to maintain desired temperature, and oil is withdrawn from the top of the settling tanks to be charged to the dirty reclaimable lube-oil storage tank. Bottoms from the settling tanks are withdrawn from the cone-shaped lower section and combined with the steam condensate from the coils and enter a sump.

Meanwhile, dirty crankcase oil goes directly to the reclaimable storage tank from where the oil is pumped to a surge pot for charging to a centrifuge. The centrifuged oil is next charged to three filters which may be connected in parallel or series, where the final reclamation takes place. The reclaimed oil from this step is then placed in storage where it may be picked up again by the lube-oil transfer pump and charged to the compressor units to begin another cycle. Provisions have been made to recycle the reclaimed oil through the centrifuge and filters as many times as necessary to bring it within desired specifications before entering storage.

Acknowledgments

The cooperation of the management of Lion Oil Co. in the preparation of this material is herewith acknowledged as well as the personal assistance of R. L. Van Zandt, plant superintendent; S. B. Johnson, assistant plant superintendent; and Edwin Head, process engineer at the Barton plant.

ALL-SEASON EMULSION-BREAKER EFFICIENCY



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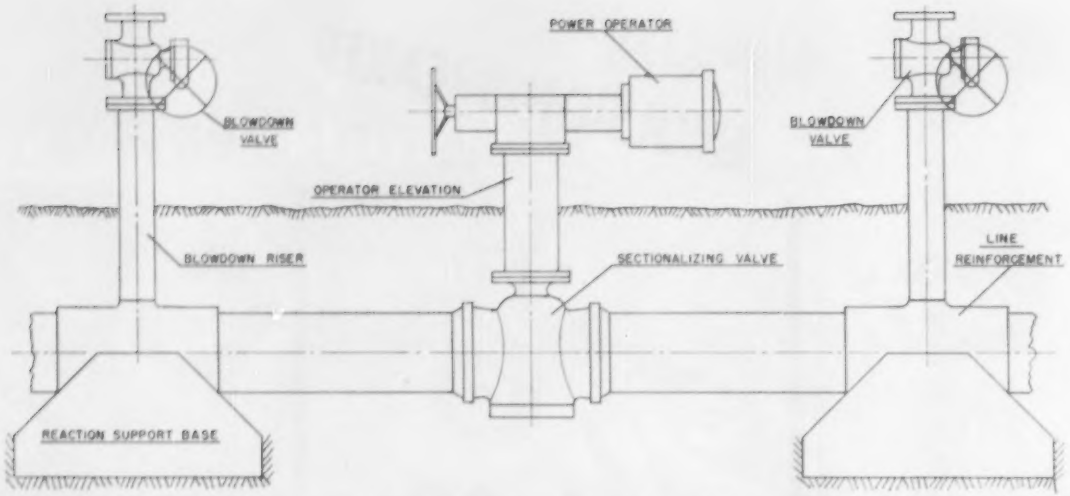


Typical blowdown and sectionalizing valve installation on gas line. High thrusts developed in early stages of blowdowns require adequately designed blowdown supports. Fig. 1.

What you should know about

Design of Gas Pipeline Blowdowns

Proper valve sizing for desired exhaust time and determination of necessary mechanical strength to resist reaction thrust are important considerations in design of blowdowns.

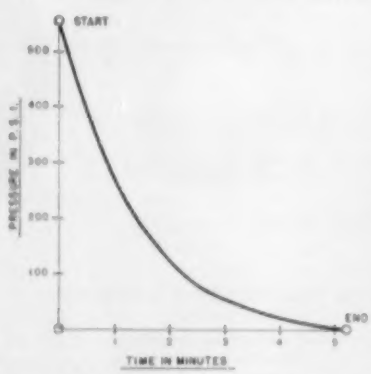
by H. A. Altorfer

GAS pipeline systems are divided by main-line valves into sections approximately 10 miles in length. Each section usually contains two blowdown valves to permit exhausting of the line for purposes of making repairs, tieins, etc. Proper design of these blowdowns is very important since the jet which issues from them, as from a rocket, causes a violent opposing thrust.

Blowdown time is also of considerable importance. The sections usually contain a great amount of gas, and the time for complete discharge may range from half an hour to half a day. In any case, the size of the blowdown branch can be and should be calculated to meet the desired exhaust time and the branch supports must be designed to withstand the maximum thrust resulting from high-pressure blowdown.

Installation . . . A typical blowdown branch installation is shown in Fig. 1. There is a blowdown valve on each side of and within about 25 ft. of the main-line valves, their size chosen to meet the desired emptying time of the section.

Since each section contains at least two blowdown valves, both may be in operation simultaneously, thus reducing blowdown time to a minimum. For reasons of economy, the size of the blowdown valves should be specified as small as possible. The thrust reaction, in a direction opposite to the discharging gas, is usually of considerable magnitude and requires a substantial foundation and line reinforcement below the blowdown riser.



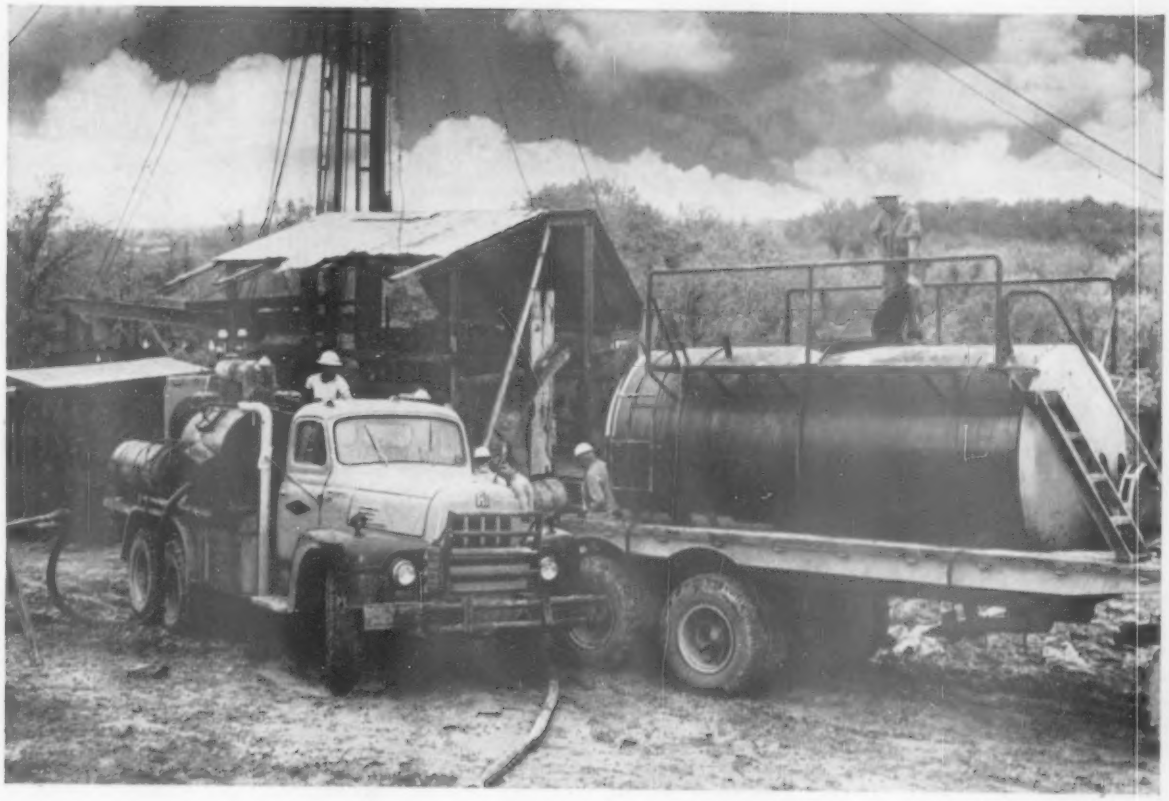
Pressure drop with time in normal blowdown operation. Fig. 2.

Selection of the size of the blowdown system is a compromise of various opposing factors. The larger the blowdown riser, the faster a line section can be emptied. The rate of discharge increases proportionally to the square of the diameter. However, the thrust reaction also increases in proportion to the square of the diameter and requires an increasingly larger, reaction-supporting foundation.

Blowdown process . . . Before blowing a section down, the sectionalizing main-line valves must first be closed. If a line accidentally ruptures, the two adjacent sectionalizing valves may close automatically by means of an automatic line-break control or a section may be isolated semiautomatically by push-button controls which actuate power operators to cause closing of the sectionalizing valves. Blowdown valves are usually operated manually but occasionally they are equipped with power operators and actuated by semiautomatic controls.

Blowdown characteristics . . . Blowdown characteristics, i.e. the drop in line pressure versus time, can readily be calculated. Fig. 2 shows a typical plot of line pressure versus time as predicted and experimentally verified.[1] An analysis of the flow pattern through a

Author is with Rockwell Manufacturing Co., valve research and development department, Pittsburgh.



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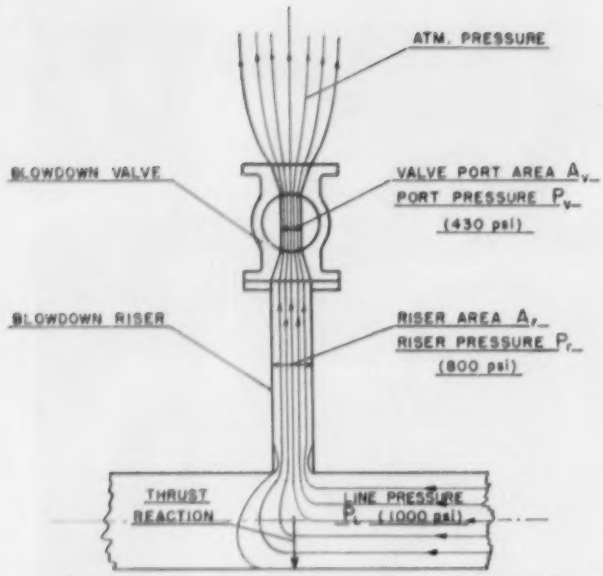
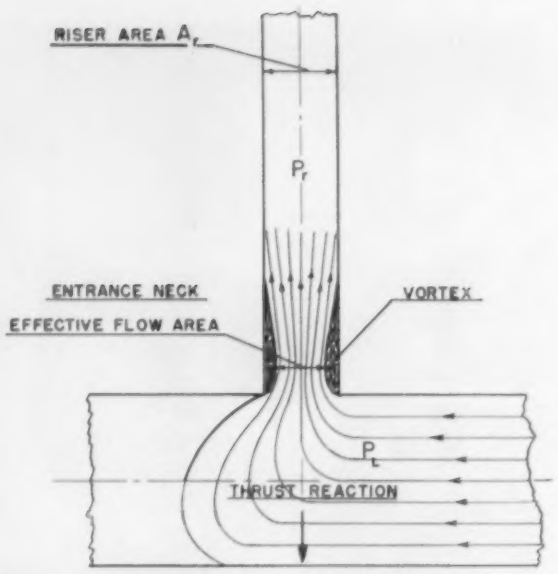


Flow lines into riser and typical pressure values when exhausting from 1,000 psi. Fig. 3.



Square-edged opening into riser causes considerable constriction of flow lines into neck. Fig. 4.

blowdown system is necessary for the purpose of predicting the exhausting characteristics and the blowdown time. The valve port area alone is no measure of the discharge capacity of a blowdown branch.

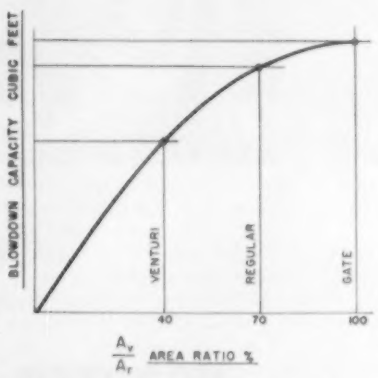
The flow pattern existing between main line and atmosphere is shown in Fig. 3. Values given are typical for blowing down from a pressure of 1,000 psi. Of particular concern are (1) the entrance neck at the junction of the blowdown riser with the pipeline, and (2) the valve port.

The condition at the entrance neck is shown in detail in Fig. 4. It is not practical to make this entrance anything but square edged; therefore the resulting flow lines form a considerable restriction, surrounded by high-velocity vortices. In passing through the entrance neck, the gas is experiencing a drop in pressure from line pressure, Pl, to riser pressure, Pr, which is also the gas pressure ahead of the valve. The velocity of the gas through the valve port is equal to the velocity of sound (approximately 1,400 ft. per second) and the flow capacity of the valve is proportional to the pressure Pr in the riser immediately ahead of the valve.

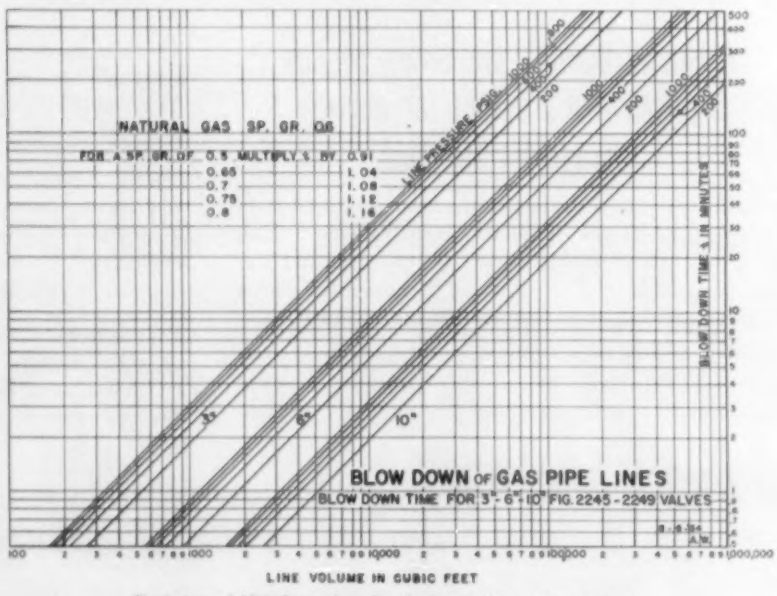
In considering the influence of an increase in valve port area, it would appear that the valve capacity was being increased. However, in order to pass more flow through the inlet neck, the riser pressure Pr must drop. And, since the flow capacity of the valve is proportional to the riser pressure, a relative decrease in flow per square inch of port area is taking place. Thus the gain expected from an increase in port area is not fully realized.

An indiscriminate increase in valve port area alone leads rapidly to the condition of diminishing returns. This situation is shown in Fig. 5, a plot of the port-area ratio vs. blowdown capacity.

The port area is usually given as a percentage of the pipe area and is called port-area ratio. This ratio amounts to approximately 40 per cent on venturi-type plug valves and 70 per cent on regular-type plug valves. There is only a small gain in blowdown capacity (or blowdown time) when going from 70 to 100 per cent port area. From Fig. 5 it appears as though a 60 to 70 per cent valve would be the most economical choice. This happens to be



Variation of blowdown capacity with valve port area. Fig. 5.



Variation of blowdown time for 3, 6, and 10-in. pipe. Fig. 6.

You can now use emulsion muds in exploratory wells with no danger of affecting analysis of cores and cuttings.

Those who visited our booth at the AAPG meeting (Los Angeles Biltmore, November 11 & 12), saw a demonstration under black light that proved some interesting facts about emulsion muds. An emulsion mud will speed up the rate of penetration by slicking up the hole, drastically lowering drill pipe torque, reducing wear and tear on equipment, depositing a thin mud cake, reducing filtrate loss, helping keep a hole "to gauge", and generally eliminating many sources of drilling troubles.

But geologists have repeatedly objected to the use of emulsion muds in exploratory wells (and rightfully so) because the oil in the mud contaminates cores and cuttings and makes it impossible to tell whether oil in the samples comes from the formation or from the emulsion mud. The only solution to the problem is to use a non-fluorescing oil for the emulsion mud. No-Glo is the only non-fluorescing oil commercially available today and our widely scattered field jobs to date have proved conclusively that No-Glo does not become colored or fluorescent under drilling conditions.

At the other extreme, core analysts have told us that there is no need to go to a non-fluorescing oil—that a diesel oil is adequate—because they can tell the difference in fluorescence and cut between a diesel oil and crude oil. In our demonstration under the black light such was not the case. Diesel looks very much like condensate, and after aging under temperature the unstable hydrocarbons in diesel oil polymerize and oxidize until the the diesel cannot reasonably be distinguished from crude oil.

Well logging crews themselves have conceded that under drilling conditions, diesel oil, stove oil, numerous other refined oils, fluorescing emulsifiers and crude oil all begin to look alike under the ultraviolet light and accurate interpretations are impossible.

No-Glo has improved drilling operations without interfering with geological interpretations, in many diversified domestic fields and in two foreign countries, and has been used with excellent results in an offshore job. For example, No-Glo was used successfully by Shell at Weeks Island, Louisiana (Gonsoulin-Minvielle State Unit #2) from 16,100' to 18,200'. This was the deepest producing well in the world when completed. Shell also used No-Glo in another well in this field for spotting opposite pipe that was tightly stuck at about 9,600' in a "keyseat". No-Glo not only freed the stuck pipe but prevented complications by introducing no fluorescence to the mud system. Others are now using it in wildcats in place of crude oil for freeing stuck pipe. A supply of 40 to 50 barrels at the rig ready for use, may save an expensive fishing job in case pipe becomes stuck. It is low-cost insurance.

No-Glo oil is a specially treated oil which may be added to any clay-water mud in the normal manner. A U. S. Patent has been allowed to Oil Base, Inc. on the use of No-Glo, and numerous foreign patents are pending. Licenses to oil companies and their subsidiaries to use No-Glo oil on a nominal royalty basis will be considered upon request.

If an emulsifier is to be used, White Magic is a whitish, readily-soluble, powdered emulsifier that does not fluoresce.

Together with No-Glo oil White Magic forms an excellent low-water-loss emulsion mud that has a flexible weight range, is electrically conductive, easily controlled and may be used without caustic soda for moderate pH ranges of drilling mud.

There are also many instances where pipe dopes gradually contaminate the mud and interfere with core and cutting interpretations. To prevent this hazard, insist on No-Glo Thread Lubricant when drilling wildcats even though an emulsion mud may not be required. No-Glo Thread Lubricant will not fluoresce and contains no fluorescence suppressors. Packed in 50 lb. pails.

Again, due to OBI research, a well-recognized need but hitherto unanswered problem has been solved. If you run into trouble during drilling and would like to switch to an emulsion mud that will not affect core analyses, No-Glo is the *only* answer. For more details, see editorial article on No-Glo appearing in this issue.

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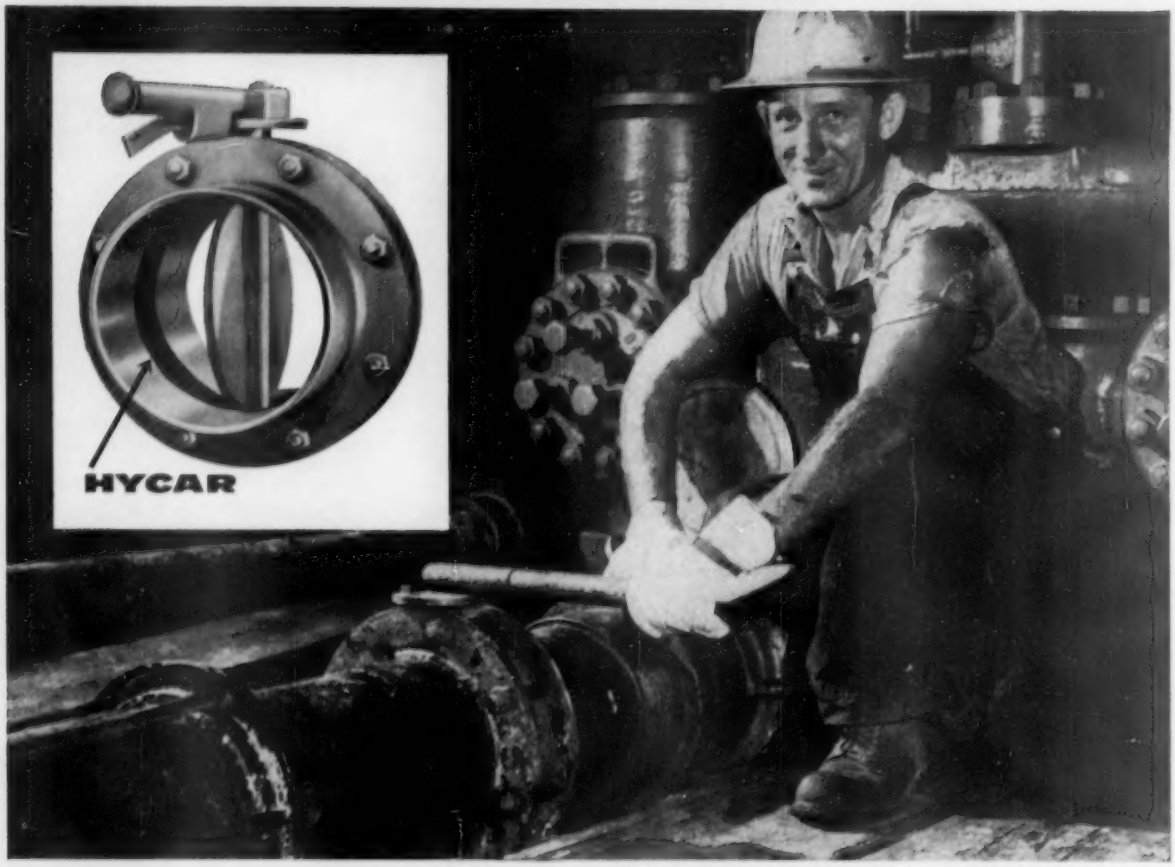

Keystone Butterfly Valve made by Keystone Tool Company, Houston, Texas. Hycar parts supplied by Murray Rubber Company, Houston. B. F. Goodrich Chemical Company supplies the Hycar rubber only.

HYCAR SEALS TIGHT...BEATS DRILLING MUD'S BITE!

MAINTAINING a positive seal under high pressure or vacuum despite the abrasive action of drilling mud is an ideal job for Hycar American rubber—as proved in the butterfly valve pictured.

The valve is used in oil well drilling rig mud lines, and similar severe services. It has a tough, resilient seat made of Hycar rubber which the butterfly disk contacts when closed. Should sand or other foreign matter be caught between the disk and the Hycar seat the seat deforms against them yet maintains a sure seal—even if the disk should become eroded or corroded.

Hycar lasts through long, hard service and has exceptional resistance to heat, cold, oil, gas and many chemicals, making it ideal for many applications. If you have a product that requires improvement in these qualities or a development that needs them, see first what Hycar can do. For technical information, please write Dept. HJ-13, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

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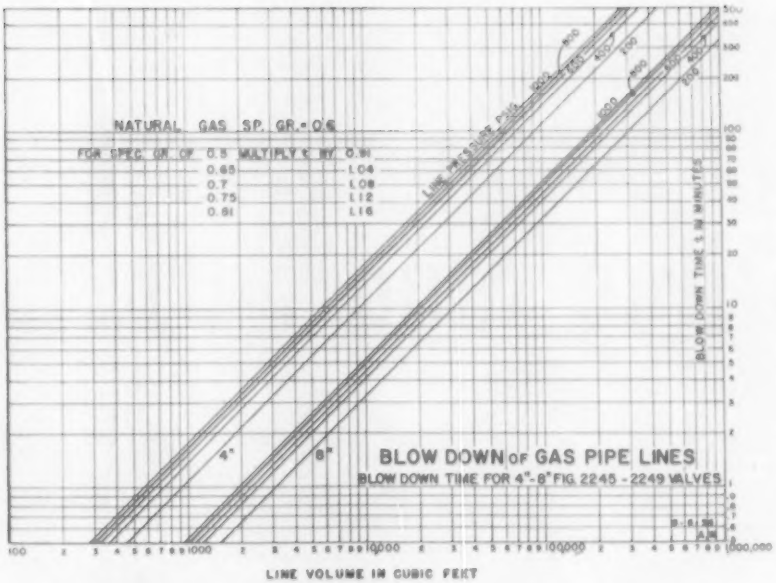

NATURAL GAS SP. GR. = 0.6
FOR SPEC. GR. OF 0.5 MULTIPLY K BY 0.91
0.65 1.04
0.7 1.08
0.75 1.12
0.81 1.16
LINE PRESSURE P.S.I.
BLOW DOWN TIME IN MINUTES
4"
8"
BLOW DOWN OF GAS PIPE LINES
BLOW DOWN TIME FOR 4"-8" FIG. 2245 - 2249 VALVES
LINE VOLUME IN CUBIC FEET

Blowdown time for 4 and 8-in. lines for various pressures and volumes. Fig. 7.

the range covered by the regular series of lubricated plug valves.

Blowdown size . . . The size of the blowdown branch can be determined from Figs. 6 and 7 for various system capacities. In practice, the volume of the piping which is to be blown down is usually known. The blowdown time to empty the system can be read directly from the vertical scale for various line pressures and various sizes of regular-type plug valves. In the final selection, that blowdown size is chosen which approaches most nearly the desired blowdown time.

The curves shown on Figs. 6 and 7 have been arrived at by means of a logarithmic equation. The course of the line pressure time can be plotted by computing values obtainable from this equation. Line pressure time curves may also be obtained by the more elementary method given in Trasy S. Park's paper.[1]

Figs. 6 and 7 are drawn under the assumption that one blowdown valve is open. For systems having two blowdown valves in operation simultaneously, the curves still apply if it is remembered that each valve will then have to empty only half of the piping system. The selection will be made in this case for half of the total volume which must be blown down.

Reaction-supporting foundation . . . The thrust reaction created by the jet issuing from the blowdown valve in a direction opposite to the discharge can readily be calculated from the fundamental equation

$$P = (W/g)\, v_s \qquad (1)$$

Where:

P = thrust reaction in pounds
W = discharge of gas in pounds per second
g = acceleration due to gravity in feet per second per second
v_s = velocity of sound in feet per second

The discharge W is directly proportional to the line pressure and depends on the blowdown size. For a specific blowdown system, the thrust reaction can be obtained from

$$P = C\, p \qquad (2)$$

in which C = blowdown-system characteristic, taking into account riser size, valve size, and valve type.
p = line pressure in psia.

For the most common conditions encountered in practice, the magnitude of thrust can be read directly from Fig. 8. The jet effect is obviously most severe at the beginning of the blowdown period; during the process of blowing down the line, pressure gradually decreases to zero and so does the jet effect. The blowdown riser must be so constructed and supported that it will take care of the thrust reaction by keeping its effect on the piping system harmless.

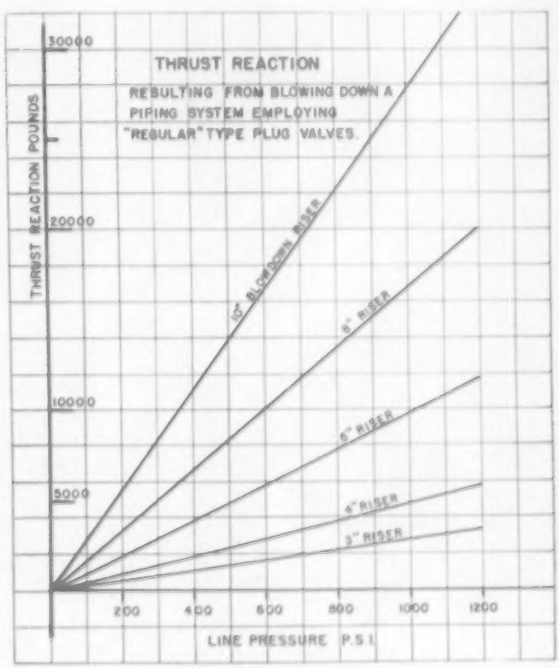
The amount of thrust shown on Fig. 8 is obtained when the blowdown valve is wide open. It is proportional to the momentary discharge W in Equation 1. In practice, the valve is opened gradually so that the peak thrust may be kept down to a much lower magnitude. This results in a slight increase in blowdown time.

Acknowledgment

Credit is due to A. Wolfensperger, mechanical engineer of Rockwell Manufacturing Co., for the mathematical work leading to the logarithmic equation which formed the basis of Fig. 6 and Fig. 7.

Reference

1. Determination of Valve Size and Exhausting Time for Blowdown of Gas Pipelines, by Tracy S. Park, Jr., Tennessee Gas Transmission Co.



Maximum reaction thrust for several riser sizes and various line pressures. Fig. 8.

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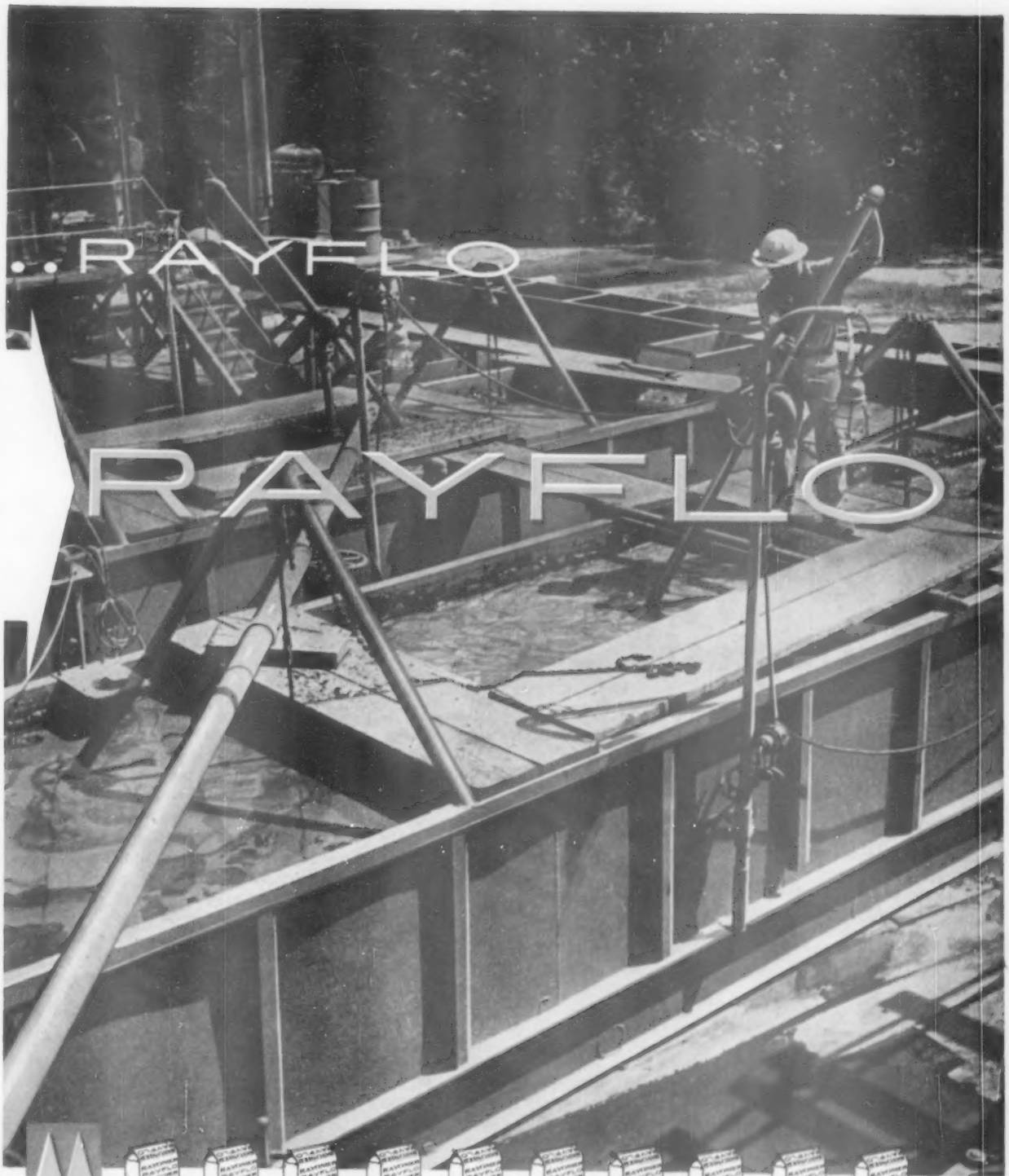

Photo Courtesy Standard Oil Company of New Jersey

cellulose chemistry

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Fig. 1—The new dispersant being added to a mud system on a California well where some of first field tests were conducted.

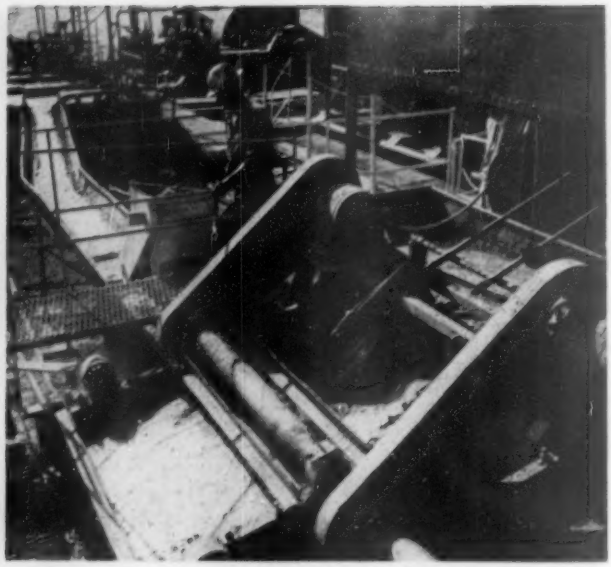


Fig. 2—One of the advantages claimed for the new dispersant is that it is compatible with all popularly used mud additives.

New Mud Dispersant Developed From Domestic Sources

A NEW dispersant for oil-well drilling muds which can serve as a replacement for imported dispersants is now in commercial production in this country.

The product, termed "Rayflo," was developed through the search for a domestic product in adequate supply to replace quebracho extract. It is reported to be resistant to the adverse effects of contaminants such as cement, salt, and calcium sulfate; and this resistance results in a stable mud which is economical and efficient.

In drilling certain formations, drilling mud picks up clay particles which hydrate and tend to thicken the mud itself, making it difficult to pump. In shallow wells, the mud is thinned with water; but as the hole deepens, it is necessary to add large quantities of weighting materials to maintain a heavy enough density to prevent blowouts. Dilution with water at this point would be impractical and wasteful, so it becomes necessary to use thinners which keep the mud dispersed and fluid enough to be circulated.

Description . . . The new product is a reddish-brown powder, described chemically as a "polymeric polyphenol." Rayonier, Inc., has been working on it for more than 3 years; and construction of the plant at Hoquiam, Wash., where it is now being made, followed tests in pilot-plant operations. It is now available in commercial quantities, and has been thoroughly field tested.

The company started out to find some use for hemlock bark, a nuisance byproduct of pulp making which hitherto served no useful purpose except for fuel.

Advantages claimed . . . The new product is said to be readily soluble in water and does not require caustic soda for dissolving. Therefore, less caustic soda should be required to attain a given level of performance.

Tests show, the manufacturer claims, that mud treated with the product has lower viscosity and gel strength at **low alkalinity** than a quebracho-treated mud. When tested in **high-alkalinity** fresh water and lime muds, Rayflo shows good properties as a thinner; and, furthermore, when converting a fresh-water mud to a lime-base mud, the breakover is accomplished smoothly.

Other advantages claimed for it are:

1. It is effective in practically every type of mud over a wide range of conditions.

2. It is easy and convenient to handle.

3. It is completely and easily soluble under all pH conditions.

4. Its action is quick, giving better control of the drillng mud, and helping to prevent overtreatment.

5. Cost is relatively low.

6. Mud treated with the product is resistant to the flocculating effects of contaminants.

7. It works well as a thinner for calcium-treated muds, as well as an emulsion stabilizer in preparing and maintaining an oil-emulsion mud.

8. It is compatible with any of the popular additives and can be used to advantage with any of them.

Analysis . . . Essentially, Rayflo is a byproduct of wood. Its chemical analysis in percentages is as follows: sodium, 10; potassium, 0.1; calcium, 0.1; iron, 0.8; copper, 0.002; manganese, 0.02; methoxyl, 1.4; phenolic hydroxyl, 8.5; sugars, by chromatography, 0.0; moisture, 3.5. In a 1 per cent aqueous solution, the pH is 8.5.

Characteristics . . . In fresh-water muds, the lowest mud viscosities and gel strengths with the new product have been obtained in pH ranges of 11 to 12.5 and 7.5 to 8.5 (especially in aged mud systems). Somewhat higher values

are obtained at intermediate ranges. A pronounced advantage of Rayflo-thinned muds is in an aged system, such as is essentially present in drilling.

Lime-treated muds are usually prepared by conversion of fresh-water muds which frequently contain quebracho as a deflocculant. Conventional lime-treated muds are prepared by adding to a high pH fresh-water mud, additional deflocculant (calcium lignosulfonate or quebracho) and more than enough lime to saturate the system. The amount of lime is frequently in the order of 5 to 15 lb. per bbl. of mud.

Recently, however, low caustic soda-low lime muds have been used successfully. These muds are stated to be particularly useful in very deep, high-temperature wells where the conventional type of lime-treated mud (high caustic soda, high lime) tends to react with clay to thicken the mud or form a hard cement. The low caustic soda-low lime muds are generally prepared by adding small amounts of lime (of the order of 1 or 2 lb. per bbl.) to a low-pH fresh-water mud.

The new product is said to be an effective additive both before and after conversion to lime-base muds. It has also been found to be a satisfactory breakover chemical. Preliminary tests indicate that Rayflo performs well in low caustic soda-low lime muds, and has considerable promise for this application.

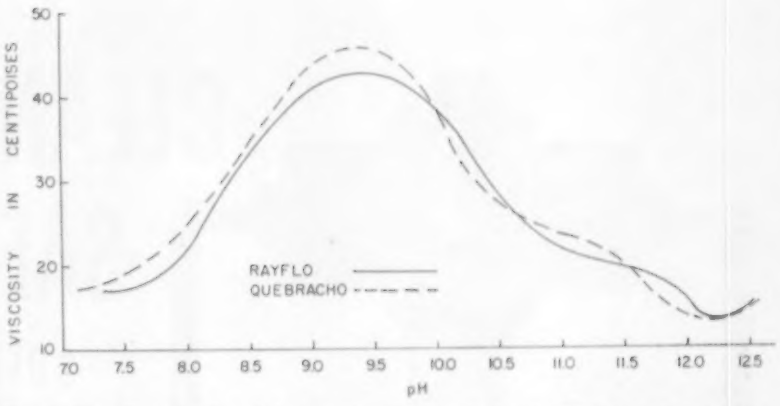


Fig. 3—The effect of pH variation on viscosity of a fresh-water drilling mud, tested at a constant additive level of 2 lb. per bbl.

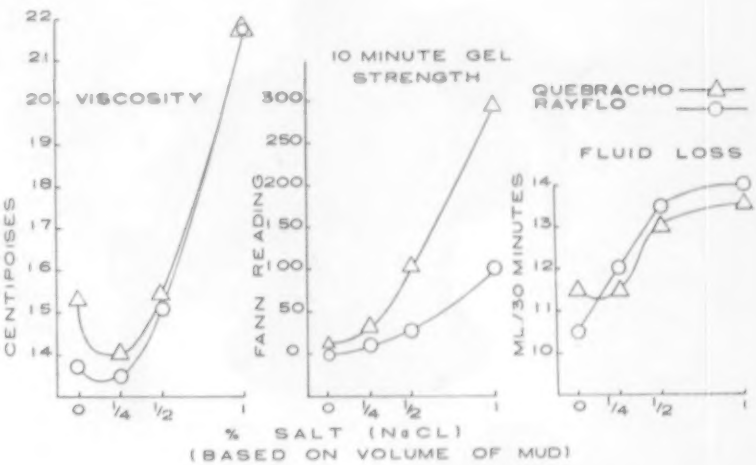


Fig. 4—(Above) The effect of salt contamination in a fresh-water mud with a high pH (12.0), at an additive level of 2 lb. per bbl.

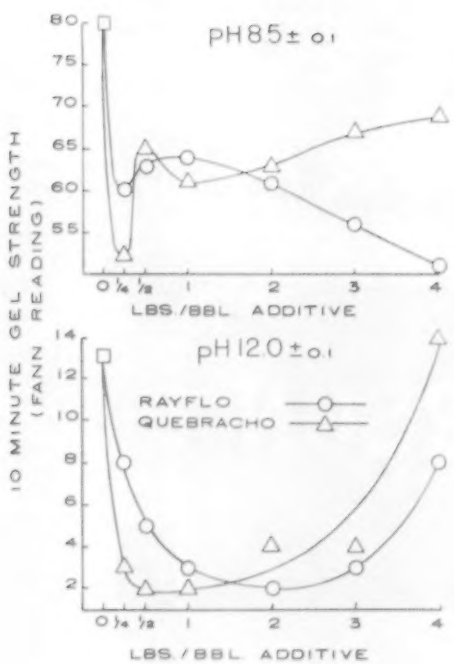
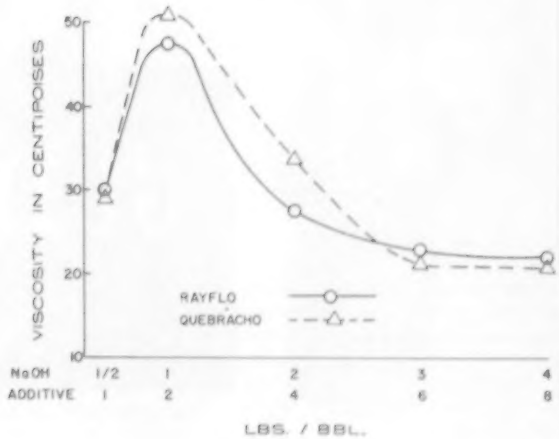


Fig. 5—(Left) The effect of variable additive concentration on the 10-minute gel strength of a fresh-water mud at a high and a low pH value.

Fig. 6—(Below) The effect of additive variation on viscosity of a fresh-water mud, tested at a constant ratio of 1:2 caustic soda to additive.



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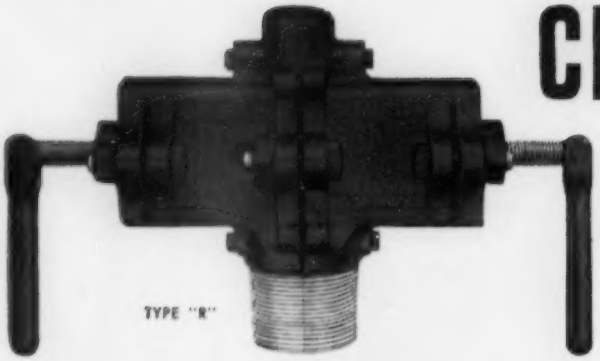

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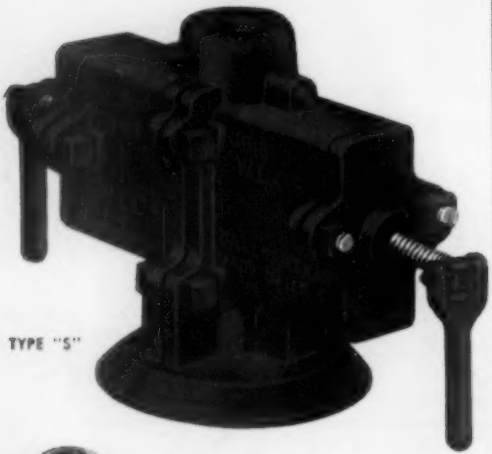

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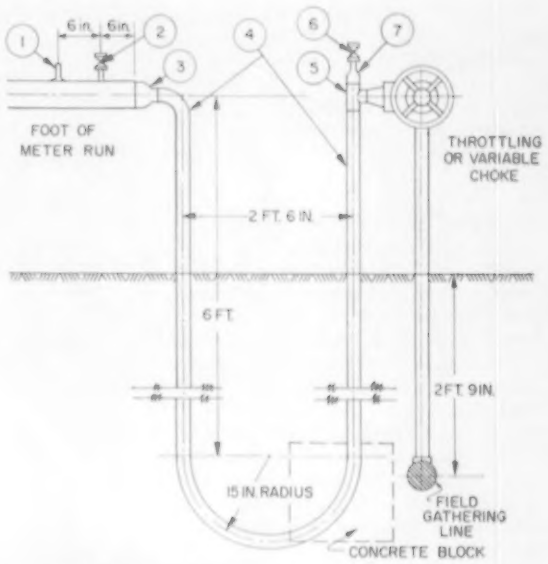


Diagram of sampling loop at foot of meter run for split-stream testing. (1) ¾-in. thermometer well. (2) ½-in. needle valve. (3) 4 by 2-in. concentric weld reducer. (4) 2-in. EUE tubing of 2½-in. hydraulic tubing. (5) 2-in. standard welding tee. (6) ¾-in. 3,000-psi. w.p. gate valve. (7) 2 by ¾-in. swage nipple.

SPLIT-STREAM TESTING OF GAS-CONDENSATE WELLS

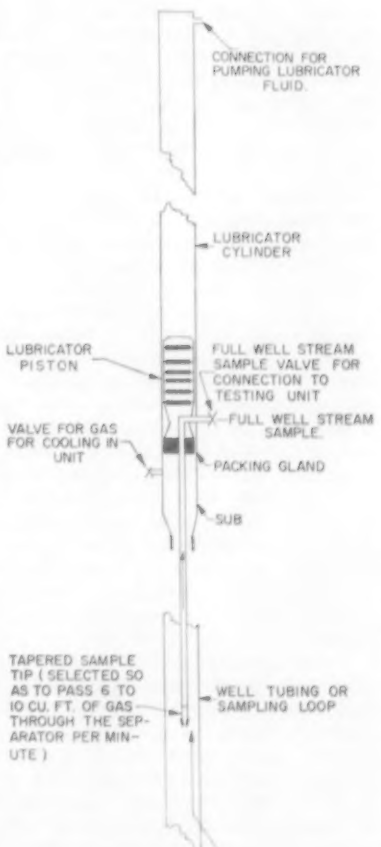
by W. A. Frier

Method is rapid and when properly employed will obtain representative samples of the liquid and gas phase constituting the full well-stream composition.

BECAUSE of both economical and practical advantages, split-stream testing is now being employed in preference to the full-scale field separator testing apparatus for testing and sampling of gas-condensate wells.

The control of temperature and pressure on full-scale separators in the field requires heavy equipment which is costly to install, operate, and transport. Furthermore, flow of the well has to be controlled within stipulated ranges in order to maintain adequate heater capacity, and/or refrigeration capacity, and separator efficiency during testing. In the case of high-pressure gathering systems, it is usually necessary to flare large quantities of gas during a test with a field separator. Moreover, operating conditions of a field separator are very difficult to maintain during changing atmospheric temperature.

Author is with Southern Petroleum Laboratories, Houston. Paper presented at N.G.A.A. regional meeting, Tyler, Tex., October 26, 1954.


CONNECTION FOR PUMPING LUBRICATOR FLUID
LUBRICATOR CYLINDER
LUBRICATOR PISTON
FULL WELL STREAM SAMPLE VALVE FOR CONNECTION TO TESTING UNIT
FULL WELL STREAM SAMPLE
VALVE FOR GAS FOR COOLING IN UNIT
PACKING GLAND
SUB
TAPERED SAMPLE TIP (SELECTED SO AS TO PASS 6 TO 10 CU. FT. OF GAS THROUGH THE SEPARATOR PER MINUTE)
WELL TUBING OR SAMPLING LOOP

Flow diagram of lubricator sampling device in operating position.

Split-stream testing of gas-condensate wells can be executed in much less time with very rigid control of temperature and pressure, and when properly employed, will obtain representative samples of the liquid and gas phase constituting the full well-stream composition. This method is sufficiently accurate for all practical and engineering purposes. Briefly, the method consists of splitting off a small continuous representative sample of the well stream and separating it into its gas and liquid phases for measurement and analysis. This splitting-off procedure is accomplished by introducing a sampling tube into the turbulent full well stream for the purpose of withdrawing a fixed proportional sample.

At reservoir conditions of temperature and pressure, the liquefiable hydrocarbons produced from a gas-condensate well exist in a gaseous phase. Any consequent reduction of temperature and pressure occurring as this gaseous phase is produced, results in the condensation of some of the liquefiable hydrocarbons. The relative amount of liquid condensed at any point in the gathering system is a direct function of the pressure and temperature at that point. In order to obtain a most accurate composition of a full gas-condensate stream, or the liquefiable hydrocarbons at some specified temperature and pressure, customarily, a gas-separator installation complete with heater, liquid and gas-measuring devices, has served as a sampling device for the pro-

curement of proportionate parts of the liquid and gas phases. In such an installation, the entire stream from the well head was passed through the separator where gas and liquid phases are separated at constant temperature and pressure for both measurement and analysis.

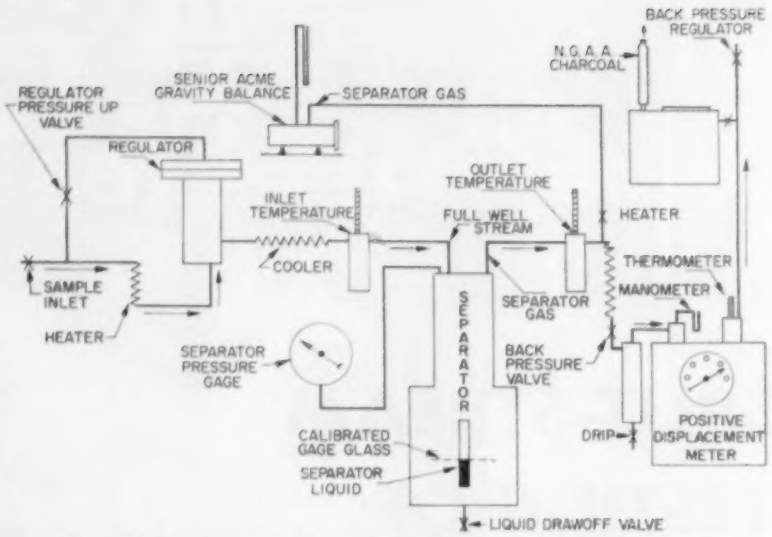
Purpose of testing . . . Information and results of separator testing of gas-condensate wells are necessary in settling the questions of mineral ownership, proration, allocation of products from central separation units and gasoline plants, development of improved methods of operation, evaluation of reservoirs, designing of equipment for processing, legal position, and taxation. Where gas-condensate is produced from two or more wells from a field or adjacent areas, it is economical and efficient to do away with individual separators and tanks on each lease, thus eliminating the loss incurred in flashing and weathering the condensate in individual tank batteries.

In present-day practice, the full gas-condensate streams are measured as a gas at well-head pressures and delivered without separation into a common gathering system of either a separation unit or gasoline plant. However, this operation produces the problem of allocation of products between leases. In settling this question, periodic tests can be made by employing a test separator at the well head for determination of the liquid and gas hydrocarbon contents.

Then from the results of the testing of each well, a theoretical yield can be calculated by employing the full well-stream measurements and the determined liquid and gas hydrocarbon contents. A factor derived by dividing the measured products from the central separation unit or gasoline plant by the theoretical yield can then be applied to the full-well stream production as measured at the well head, for allocation of products to each well.

Split-Stream Sampling

The well stream should be sampled on the surface at the highest pressure and temperature available because the ideal point of sampling is at a point where there is the least amount of liquid phase present. A sample is taken at this point by installing a lubricator containing the sampling tube either at the top of the christmas tree or on an improvised vertical sampling loop. This lubricator contains the sampling tube on the lower end of which is mounted a streamlined sample tip and on the upper end, a piston. Either gas pressure or pump pressure applied to the upper side of the piston forces the piston to the bottom of the lubricator and, therefore, the sampling tube down into the well tubing or sampling loop so that the streamlined tip is at a point in the sampling section where a sample may be taken from an undisturbed portion of the well flow.



Flow diagram of the split-stream testing units operated by Southern Petroleum Laboratories.

The turbulent flow of the gas is directed upwards against the sampling tip. This gas is a fog containing liquid particles. Some of the liquid undoubtedly flows along the tubing wall but any appreciable amount as it collects is swept back into the turbulent stream by the velocity of gas in the sampling area.

Knowing the cross-sectional area of the sample tip and the cross-sectional area of the sampling section and the total rate of flow up the well tubing or sampling loop, the velocity of the gas entering the sample tip can be made approximately equal to the velocity of the gas passing the sample tip by controlling the withdrawal of separator gas in the portable testing unit. If these two velocities are maintained identical during the sampling period, a liquid particle in the fog approaching the sample tip is not disturbed from its path in motion. The liquid particles are uniformly distributed in the fog approaching the sample tip and a representative sample containing aliquot portions of liquid and gas can be obtained.

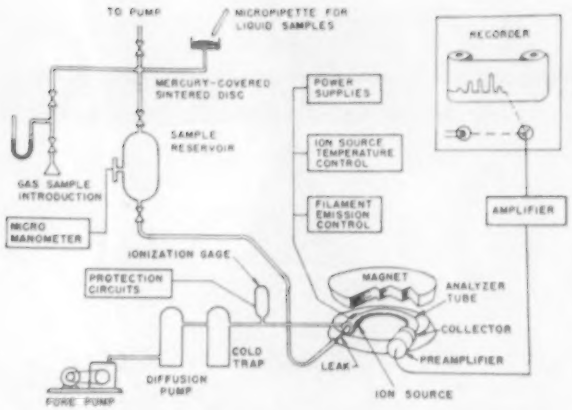
If withdrawal of well stream through sample tip is too rapid, dry gas will be drawn in, resulting in a low liquid content. If gas is drawn through sample tip too slowly, more liquid particles will enter test separator unit resulting in a high liquid content. Well must be flowing at a stabilized rate so that undisturbed fog in the tubing or sampling loop contains a constant amount of free liquid.

There are two types of streamlined sampling tips, a tapered and a straight type, customarily used.

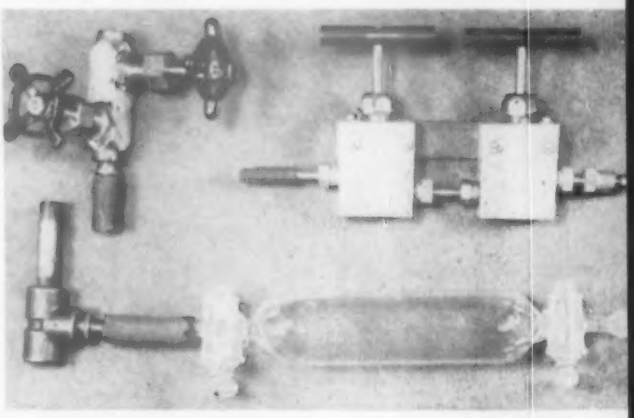
Testing apparatus . . . The equipment consists of a small separator machined from solid steel block with a calibrated liquid accumulator in the bottom. The gas-condensate stream from the sampling tube is heated either in a steam bath or an electrically heated bath and then dropped to separator pressure by means of a high-pressure regulator. The gas-condensate stream entering the separator is cooled to separator temperature in a refrigerated exchanger. The separator is mounted in a thermostatically controlled bath complete with stirrer.

The dry gas from the separator passes through a heat exchanger and is then reduced to approximately atmospheric pressure by a back-pressure regulator before being measured by a positive-displacement type of gas meter, or a critical-flow prover. The gasoline content of separator gas after passing through positive displacement meter can be determined by the N.G.A.A. charcoal method. Samples of the separator liquid and separator gas can also be taken for fractional analyses in the laboratory.

A separator gas-oil ratio is determined by calculating the measured amount of separator gas produced for a measured amount of liquid accumulated in the bottom of the separator. The stock-tank yields can be calculated by determining a shrinkage factor by flashing liquid at separator conditions to atmospheric pressure either by instant flash separation, stage separation, or differential flash separation. Also, the amount of water in the flow stream of a well can be determined.



SIMPLIFIED DIAGRAM showing how the mass spectrometer operates. Fig. 1. Courtesy, Consolidated Engineering Corp.



SAMPLING CONNECTIONS used to collect samples for mass spectrometer. Fig. 2.

How a mass spectrometer can help to

Improve Your Refinery Operations

by G. Dean Hoggan and Clifford Shaw

THE mass spectrometer has proved an invaluable aid in improving operations at the Wilmington, Calif., refinery of Richfield Oil Corp. It is used in control of operating units, in compiling information for the accounting department, in trouble shooting where operating units are in difficulty, in evaluating efficiencies of various processes, in air-pollution work, and in establishing fair bases for sales or exchanges of petroleum products.

How It Operates

A simplified diagram of the mass spectrometer is shown in Fig. 1. There are two vacuum systems; one is for the sample introduction and the other for the analyzer tube assembly. The sample is introduced at one point if a gas, and if normally liquid, at another point as indicated by the diagram. The small amount of liquid introduced changes to the gaseous state in the previously evacuated system.

By opening valves or stopcocks, the sample is introduced into an ionizing chamber where it is bombarded by electrons which cause some cracking of complex molecules and the formation of positively charged ions. These ions are sorted by means of electrical and magnetic fields. The ions in focus strike a collector plate and produce a current which is magnified by an amplifier. A photographic device makes a recording showing the different ion intensities.

Paper presented at fall meeting, C.N.G.A., Los Angeles, 1954.

These are called peaks.

In some installations, an analog to digital converter is used to either type out the corrected peak heights or to operate a key punch machine. Cards from this machine could be used in an electronic digital computer.

The cracking pattern of any gas depends upon its molecular structure. Molecules with different structures have different patterns. These patterns remain relatively constant over long periods of time. It is due to these facts that gas analysis is possible with the mass spectrometer. Of necessity, the patterns of the pure gases must be obtained before a gaseous mixture can be analyzed. Another property which must be obtained from the pure gases is the sensitivity. This is the divisions of peak height for a given mass per micron of pressure in the sample introduction system.

Sampling . . . At Richfield, all gases and hydrocarbons through pentanes are introduced into the mass spectrometer in the gaseous phase. Before L.P.G. and similar stocks can be analyzed, a small amount must be converted into gas without changes in composition. This is done in the laboratory by using special valves.

Both of the composite valves shown (in Fig. 2) have a small space between the stems. In sampling, liquid is trapped in this space and then expanded into the evacuated sample tube.

In sampling gases, the evacuated sample tube is connected to a line through a T as shown. Purging is done through a hole in the side of the stopcock. Pressure is regulated by lightly holding a finger over the open leg of the T.

Sample time . . . The actual time expended per mass spectrometer sample in Richfield's gas laboratory for instrumentation, peak picking, and computation is from 10 to 30 man-minutes depending upon the complexity of the sample. Developing time is telescoped by developing 9-15 charts at one time. Calculations are made with aid of an electric analog computer which is used for the solution of simultaneous linear equations. This instrument has very materially reduced calculation time.

The bulk of the control samples are handled by the day shift. To expedite the reporting of the analyses to the units, three men work together on the peak picking and calculations.

The time required for all work done by the mass spectrometer section of the laboratory, including maintenance, preparation of calibrating gases, paper work, sampling, etc., is 1.1 man-hours per sample.

Refinery Uses

The mass spectrometer is the best available tool for analyzing refinery gases and light hydrocarbon streams. When extensively used, it gives a daily picture of all these materials in a refinery. It furnishes the information

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necessary to predict future inventories or the changes in operations required to meet future demands. It is an aid in trouble shooting.

Control . . . The speed of the mass spectrometer makes it a very attractive instrument to use for unit control. It can quickly indicate the following:

1. The condition of cracking units.
2. The split being made by light-hydrocarbon fractionating towers.
3. The amount of conversion in butane isomerization reactors.
4. The amount of propylene in polymerization unit feed and reactor product.
5. H_2S in polymerization-unit feed stock.
6. The efficency of absorbers.
7. Gas ratios in synthesis units.

On control samples containing butenes, it is the custom to report these as total butenes. However, a split may be given. Because the butenes have somewhat similar patterns, the mass spectrometer accuracy on individual butenes isn't as good as for other gases.

Accounting . . . All light hydrocarbon streams and gases are analyzed by the mass spectrometer for the accounting department. In many instances, the analyses also serve for control or other purposes. The accounting department uses the analyses for cost accounting, computation of royalties, calculation of amounts for invoicing, data posting, and the preparation of information for the directors to use in short and long-term planning.

Mass spectrometer data are also used by the accounting department in experimental process evaluation and for permanent process records.

Trouble shooting . . . The mass spectrometer has been an exceedingly useful instrument in trouble shooting. Some of the types of problems where it has been used are as follows:

With corrosion and hydrogen blistering, the quick, accurate analyses for H_2S, CO_2, and O_2 in streams have aided in evaluating the sources of these troubles. The analysis of hydrogen probe or blister gases reveals whether decarbonization is taking place. This is shown by the presence of methane in the hydrogen.

In phosphoric acid catalyst poisoning the mass spectrometer can be very useful in showing if H_2S is present in the feed stock.

In cracking catalyst poisoning, the mass spectrometer analyses will show how the product distribution is off and how the throughput is suffering. Some keys which directly indicate poisoning are the olefin to iso ratio, the hydrogen to methane ratio, the hydrogen to C_2 ratio and the gas gravity. These may all be calculated from mass spectrometer analyses.

THE AUTHORS

G. D. HOGGAN

C. M. SHAW

G. Dean Hoggan is analytical supervisor in Richfield Oil Corp.'s Wilmington laboratory. He began his employment with Richfield as a laboratory inspector shortly after his graduation from U.C.L.A. in 1942. Since 1945 he has done a large amount of work on mass-spectrometric problems and methods and towards the development of emmission-spectrographic methods for analyses of petroleum products. He holds a B.A. degree in chemistry from U.C.L.A. and is a member of the American Chemical Society.

Clifford Shaw is laboratory supervisor in Richfield's Wilmington analytical laboratory. He graduated from U.S.C. in 1941 with a B.A. degree in chemistry and began his employment with Richfield that year. He has done considerable work on the mass spectrometer, infrared, and low-temperature-fractionation equipment. He is a member of the California Natural Gasoline Association and the American Chemical Society.

Process evaluation . . . To be effective, any process evaluation where gases or light hydrocarbons are involved must have accurate analyses of these materials. Fortunately, the mass spectrometer pretty well fills the bill. Specific usages are as follows:

A method of ascertaining the optimum conditions in an existing process is to make a change in the operating conditions and follow the results with the mass spectrometer and any other applicable tools.

Mass-spectrometer analyses have been a necessary adjunct to pilot-plant tests for evaluating operating variables.

In the design or installation of centrifugal gas compressors, the mass of the gases must be considered. Engineers are now using mass-spectrometer analyses of gas streams in order to evaluate how specific compressors would perform with these gas streams. In addition, they feel that an improperly monitored change in operation could very possibly result in poor compressor results.

In DEA tower operation, the composition of the gas feed can be found by mass-spectrometer analyses and from this the proper operating temperature ascertained. As a check, the gas from the DEA reclaimer can be analyzed.

Exchanges-sales . . . In sales or exchanges, the mass spectrometer operators stress accuracy. This is done in the following manner. Where possible, samples of this nature are accumulated over a period of time and run concurrently with new calibrations for all gases involved.

Samples which must be run frequently have calibrations run at intervals which are shorter than for other materials.

Air pollution . . . With reference to air pollution, petroleum refiners are sensitive to the word hydrocarbons. The mass spectrometer is sensitive to hydrocarbon compounds. With special sampling techniques, it will reveal very minute concentrations of these compounds. This makes it a very valuable tool for the refiner to use in air-pollution work.

The mass spectrometer has been used in the identification and quantitative estimation of nearly all materials put to the atmosphere. In addition to a host of other types of samples, automobile exhaust fumes have also been examined in this respect.

A common method of sampling for such low concentrations of hydrocarbons consists of drawing the gases suspected through a trap immersed in liquid nitrogen. A sample of the contents of the trap is subsequently admitted to the mass spectrometer for analysis.

Restrictions

Although the mass spectrometer is a fast, versatile, gas-analyzing instrument, it isn't without drawbacks. Because of its complexity, the possibility of trouble is not insignificant. Down time, due to trouble shooting and maintenance, is about 15 per cent of the total assigned operating time.

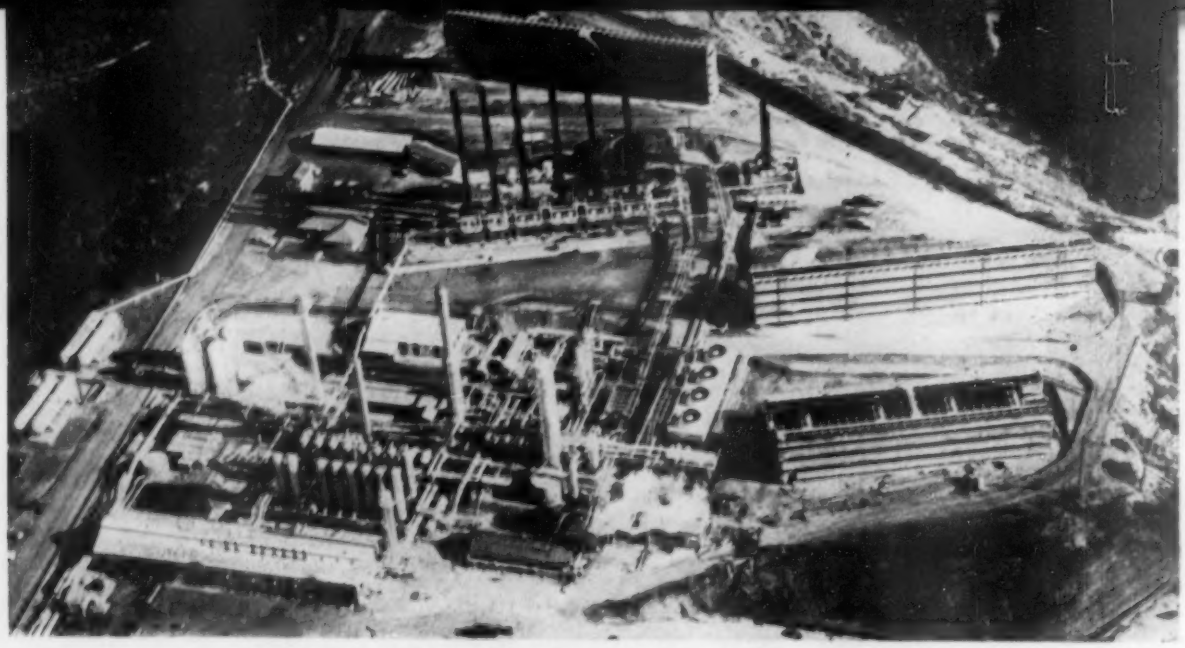
When paraffins are present in a gas, the mass-spectrometer analysis is not very reliable for small amounts of olefins: i.e., less than 1 per cent. A small amount of carbon monoxide is not detectable in the presence of other gases which contribute to mass 28. When large amounts of hexanes and heavier hydrocarbons are present, an analysis for light olefins is not feasible with the equipment now available.

The mass spectrometer is best used when complimented by fractional-distillation apparatus and spectrophotometers.

Mass-spectrometer design will continue to improve. This will result in an improvement in accuracy and less trouble shooting.

Acknowledgment

The authors wish to express appreciation to Richfield's accounting and engineering people and especially to Ralph Hoffberg for the assistance given.



Aerial view of expanded facilities at Shell Oil Co.'s gasoline plant at Ventura, Calif.

Shell Expands Ventura Gasoline Plant

Program includes . . .

- **Added capacity without added water usage.**
- **Steam-turbine operation in event of power failure.**
- **Use of remote tank gaging.**
- **Plant tests to find performance at design rate.**

by Arnold L. Johnson

SHELL Oil Co. earlier this year completed an extension program at its natural-gasoline plant at Ventura, Calif. Incorporation of new and enlarged facilities for extracting natural gasoline, butane, and propane from the natural gas increases the plant capacity to 133 million cubic feet per day.

The project, started in March 1953, was undertaken to meet increasing demands for natural gasoline and liquefied petroleum gases in southern California, and to fill the needs of Shell Chemical Corp.'s new Ventura plant for the manufacture of anhydrous ammonia from natural gas, steam, and air.

Items of special interest involved in this extension are:

1. Increase in plant capacity of about 50 per cent was obtained without increase in water usage or steam generation.

Author is with Shell Oil Co., Ventura, Calif.
Paper presented at C.N.G.A. annual fall meeting, Los Angeles, October 7-8, 1954.

2. In event of power failure many standby steam-turbine-driven units take over automatically.
3. Remote tank gaging is employed.
4. Plant tests to determine performance at design rates were made by recycling cold lean oil and unstabilized gasoline.

Ventura Processing

The process design was based on an anticipated final daily volume of 147,000 M.c.f. per day and 40 per cent propane recovery. However, the first step of the extension was built to process 120,000 M.c.f. per day, and the second step increased the design capacity to 133,000 M.c.f. per day. A third step may or may not be required depending upon future production rates in the Ventura field.

Two new 6-ft. diameter by 57-ft. by 24-tray absorbers were installed to process the additional gas. A new high-pressure lean-oil pump was installed in parallel with existing pumps to allow an increased circulation rate from 1,600 to 2,100 g.p.m. Residue gas from the absorbers is furnished to Shell Chemical Co., and the remainder sold to the local utility companies.

Deethanizer revamp . . . Rich oil from the high-pressure absorbers flows into the rich-oil deethanizer. Calculations indicated that the bottom section of the deethanizer was heavily loaded and eight caps per tray were removed on each of the 19 trays at the bottom of the column, and new vapor necks with 1-in. height above the trays were installed where the caps had been removed. The vapor necks on tray No. 1 were extended into the liquid below. The increase in rich oil flow required an additional rich-oil pump and changes to the bottoms piping. The column is reboiled by heat exchange with lean oil. The increased volume of both lean oil and rich oil required the addition of several new heat exchangers. The design of the heat-exchange equipment was complicated by the low safe working pressure of 150 psi. of the existing units. Several new units with higher allowable working pressures were installed to cool the lean oil before it reaches the old units to keep within the allowable pressure-temperature relationships.

Hot rich oil from the deethanizer

bottoms flash tank is pumped through a lean oil-rich oil heat exchanger. Oil is bypassed around this unit as required to control the temperature in the hot flash tank. The rich oil then passes through existing steam preheaters where the oil temperature is raised to 350° F. Additional heat is required to bring the rich-oil temperature to 420° F., the temperature required for optimum operation of the rich-oil still. Two new direct-fired heaters with a total designed rating of 50,000,000 B.t.u. per hour were installed for this purpose, thereby reducing the steam load of the plant. By use of these heaters, the necessity for adding boilers was alleviated.

New still . . . In the original plant, the hot rich oil was stripped in two parallel stills which operated at 50 psi. Uncondensed vapors from the still reflux condenser were recompressed, condensed, and routed to the depropanizer. A new 11-ft. 6-in. diameter by 74-ft. by 30-tray still was installed to replace the existing units.

Total condensation . . . The new still operates with total condensation in the depropanizer feed tanks. This eliminates the necessity for vapor recompression making it possible to convert the recompressors to lean-oil refrigeration service. Steam enters a lean-oil purifier, passes up through the still (countercurrent to the downflowing rich oil) and, together with the natural-gasoline vapors, enters the reflux condensers. The reflux condenser is of the air-cooled type to decrease domestic water requirements and to minimize cooling-tower heat load; in fact, no additional cooling-water facilities were required. Air-cooled units are particularly suited to the conditions which exist at the Ventura plant where atmospheric temperatures are low, space is limited, and a shortage of domestic water exists. A total of 50,000,000 B.t.u. per hour is removed at this point. The existing condensers are used as final condensers in the extended plant. A new depropanizer feed tank and an additional depropanizer feed pump were installed.

A second depropanizer was installed in parallel with the existing depropanizer. The new column is 5 ft. in diameter by 77 ft. with 35 trays, and has standard auxiliaries including reboiler, reflux condenser, reflux tank, bottoms to feed heat exchanger, propane and gasoline coolers. These columns are operated to produce liquid propane and 38-psi. R.v.p. gasoline although there are periods when propane is released as a vapor to the fuel system.

Storage . . . Additional product storage and product shipping facilities were installed, and the old storage facilities were rearranged. Approximately 50,000 cu. yd. of earth was removed from the nose of the hill adjacent and below the plant to provide space for the new storage area since there was insufficient room on the hilltop where the plant is located. Two 3,000-bbl. Hortonspheres were erected in a new storage-tank area, and these are used for the storage of 70-psi. R.v.p. gasoline. Four existing 40,000-gal. riveted storage tanks were removed from within the plant area and reinstalled at the new site adjacent to the Hortonspheres. Normally, 70-psi. R.v.p. gasoline is produced at a maximum rate up to the capacity of the gasoline shipping line between Shell's plant at Ventura and its Wilmington refinery. Any excess gasoline produced above the capacity of the gasoline line is stabilized to 38-psi. R.v.p. and injected into Shell's crude-oil line.

Some Special Features

It is of special interest to note that the capacity of the Ventura gasoline plant was increased by approximately 50 per cent with no increased use of water and no increase in the steam-generating facilities. This was made possible by the use of air-cooled condensers and direct-fired heaters in the extended unit. Further, every effort was made to conserve water; more than 90 per cent of the steam produced is condensed and returned as boiler feed water.

Turbine-driven standbys . . . The plant can be operated during periods of electric-power failure even though a high percentage of the prime movers are powered with electric motors. At critical locations, steam-driven units have been installed as spares for electric-driven units. The following steam-driven spares automatically start when there is a power failure: Lean-oil pump, hot-rich-oil pump from flash tank, and the hot-lean-oil pump. Automatic valve-closing and opening devices are installed at the pump discharges to assure a positive shutoff which is not dependent upon a check valve.

Automatic switch . . . Upon power failure, a solenoid switch in the motor circuit actuates (1) the air-operated mechanism which closes the discharge valve on the electric pump, and (2) simultaneously it actuates the air-operated steam supply valve which starts the spare turbine-driven unit. When the discharge pressure of the spare pump is sufficiently high to assure positive flow, a pressure-actuated controller opens the discharge valve. Switching back to the electric-driven unit is accomplished by operating push buttons which start the motor and operate valves.

An emergency lighting plant automatically starts when the power fails and provides the illumination required to operate during periods of power curtailment.

Remote tank gaging . . . The instrument most appreciated by the plant operators is that used for remote tank gaging. The two new Hortonspheres were equipped with double selsyn motor transmitters which transmit the tank-gage readings to an instrument in the plant control house. The indicating tapes on the four existing propane storage tanks and the four 38-psi. R.v.p. gasoline storage tanks were remodeled and transmitters added so that all product storage tanks can be gaged at the control house.

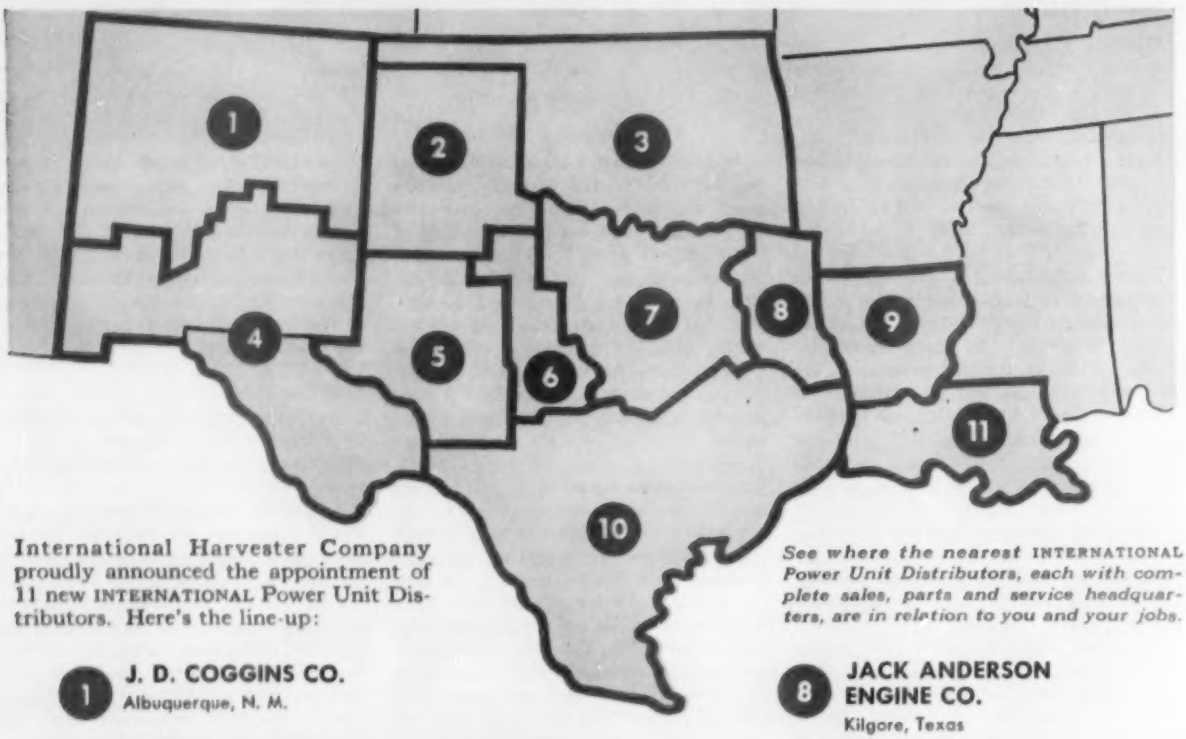
Startup . . . The switch from the old to the new equipment was relatively uneventful; however, there was an uneven distribution in flow between the two parallel direct-fired heaters. It was determined that vapor was flowing along the top of the rich-oil line and was preferentially going to one heater while the liquid was preferentially entering the other. This unbalance in flow was corrected by installing a vapor separator in the heater feed line with an automatic vapor release to the heater outlet line.

At the completion of any major construction program, it is always desirable to determine the limitations of the facilities installed. In most new gas-processing plants, it is not possible to do this until the wet-gas production reaches design rates, and this may not be until several years after construction is completed. In Ventura, it has been possible to simulate designed conditions by recycling cold lean oil and unstabilized gasoline, and, as a result, it has been tentatively determined that the plant will perform satisfactorily at designed rates. Further, additional tests are planned in which unstabilized gasoline, cold lean oil, and hot lean oil will be recycled to establish the effectiveness of preheating the deethanizer feed for increasing its capacity, and to determine the limitations of the new 11½-ft. diameter still.

The contract for the first and largest step of the project was awarded to Fluor Corp., Ltd., while the second step of the project, namely, installation of new storage and pipeline shipping facilities for 250,000 gal. of natural gasoline, and a 660-hp. gas-engine-driven compressor unit, was awarded to Guy T. Martin & Co., Inc.

Due to the fact that the existing plant site offered little space for expansion and, further, because it would have been uneconomical to shut down the existing facilities for any length of time to make tie-ins, a total of 10 different process flow arrangements were studied before the final selection was made.

IH WELCOMES
11 New Power Unit Distributors



International Harvester Company proudly announced the appointment of 11 new INTERNATIONAL Power Unit Distributors. Here's the line-up:

See where the nearest INTERNATIONAL *Power Unit Distributors, each with complete sales, parts and service headquarters, are in relation to you and your jobs.*

1. **J. D. COGGINS CO.**
   Albuquerque, N. M.
2. **HAYNES MOTOR CO.**
   Plainview, Texas
3. **CLARENCE L. BOYD CO., INC.**
   Tulsa, Oklahoma City, Oklahoma
4. **BORDER MACHINERY CO., INC.**
   El Paso, Texas
5. **FRENCH TOOL & SUPPLY CO., INC.**
   Odessa, Texas
6. **PLAINS MACHINERY CO., INC.**
   Abilene, Texas
7. **H. A. DAVIS POWER EQUIP. CO.**
   Dallas, Texas
8. **JACK ANDERSON ENGINE CO.**
   Kilgore, Texas
9. **CONTRACTORS EQUIP. CO., INC.**
   Monroe, Louisiana
10. **WHITE'S INC.**
    Houston, Texas
11. **DUNHAM-PUGH CO., INC.**
    Baton Rouge, New Orleans, La.

See the great new INTERNATIONAL Power Unit line . . . 18 diesel and carbureted models ranging from 16.5 to 200 net horsepower . . . at the distributor nearest you and check fully into the facilities he has available to serve you.

INTERNATIONAL HARVESTER

INTERNATIONAL
INDUSTRIAL POWER
MAKES EVERY LOAD A PAYLOAD

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILL.

USING THE NONCIRCULATING-TYPE heater, the painter has the heater strapped to his waist.

USING THE CIRCULATING-TYPE heater, the painter is unencumbered by equipment. The equipment used can be seen in the foreground.

Carbide & Carbon has worked out this new technique for . . .

Hot-spray application of vinyl-base paints

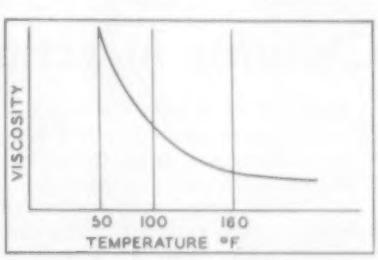
by B. C. Wright

ONE of the most promising new weapons in the fight against corrosion is the vinyl-based paints. It has been proven that they have excellent resistance to many different corrosive exposures, particularly if the system is built up to the thickness of 0.005 in. Vinyls are not easily brushed on nor do they work easily in the spray gun unless quantities of thinners are used. These facts add up to the greatest drawback in the use of vinyls—the numerous coats needed to build the system to the necessary thickness.

Seeking to overcome this drawback, maintenance engineers at Carbide & Carbon Chemicals Co. in Texas City investigated different methods of spray painting. One of the methods they experimented with was that of hot-spray application. It has proven highly successful. They found that by applying vinyls hot, it is possible to obtain 3 mils per coat, to expand the field of spray application, and to obtain a better job—all of this with less-skilled spray painters and for a lower total cost.

Spraying viscosity . . . As in any viscous fluid, the viscosity of vinyl paint is lowered as its temperature is increased. For some elevated temperature, the ratio of viscosity change to temperature change becomes very small. It therefore follows that if the vinyl paint is heated and sprayed in that temperature range, the actual spraying viscosity is constant regardless of ambient temperatures.

With a hot-spray application the atomization air pressure, the paint-pot pressure, and the gun adjustments can remain constant throughout the day and seasons. Further, no thinning is required, thereby eliminating another "painters' choice." In hot-spray applications, paint is delivered to the gun at approximately 160° F. This temperature causes immediate evaporation of much of the solvents, and this solvent evaporation depresses the temperature of the paint so that the actual temperature of the paint when striking the surface is ambient or slightly above. This solvent release increases the viscosity of the vinyl paint, and permits much greater film thickness without sag.



TEMPERATURE-VISCOSITY chart for vinyl paints. On this basis, 160° F. was chosen as the best temperature to use for hot spraying.

The first heater purchased was a portable, electrically heated, noncirculating unit originally designed for application of automotive enamels. This heater was placed in the paint line between the paint pot and the gun and was strapped to the spray man. It is an Underwriters' Laboratories-listed device of light, rugged construction—insulated, and equipped with a factory-set thermostat adjusted to 160° F. This setting has proved ideal for vinyl paints.

Film continuity was checked electrically after each coat and in every case was found to be superior with hot spray. Visual inspection by naked eye and under magnification indicated the superiority of the hot application. It had more gloss and flowed better.

On the basis of a number of preliminary tests, it was decided to hot-spray a small unit pipe rack consisting of about 3,900 sq. ft. of surface. All the tests showed hot spraying to be very promising. With respect to costs, even on this job, it was found that the

Author is maintenance engineer, Carbide & Carbon Chemicals Co., Texas City, Tex.

total labor cost was approximately 20 per cent less than a simlar job using a conventional five-coat system. Paint coverages on coats two and three were approximately 90 sq. ft. per gallon.

Paint specifications at this plant since the first pipe-rack job have called for the application of the first coat by either brush or conventional spray because hot application of the first coat was considered unnecessary. The remainder of the specifications call for second and third coats to be hot-sprayed.

On subsequent jobs, we have increased the speed of application and have realized film thickness from 3 to 4 mils and labor-cost reductions of approximately 30 per cent. An important extra advantage of the hot-spray system has been the reduction in overspray due primarily to reduced hot pressure. What little overspray exists is dry, which means that hot spray can be used in many places where conventional spray would not be possible due to paint drifting and settling on other surfaces. Direct spray may be brushed off at a distance of from 4 to 8 ft., because during travel it becomes too dry to adhere.

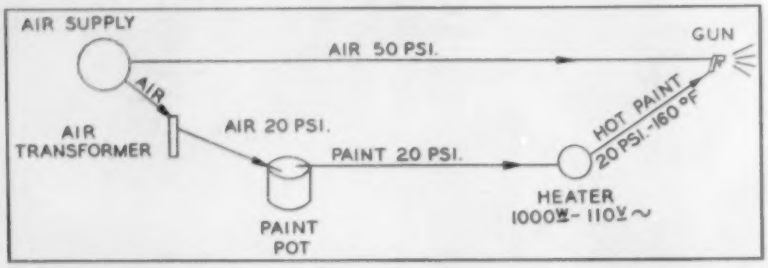
Painters like to use hot spray because it is cleaner and they believe there is less health hazard than with the fog that occurs with conventional spray. They also like hot spray because it appears that anyone can become an expert with it. No thinning is required and no sags occur. They just shoot it on in a slow single pass until it looks v/et.

Some paint manufacturers are showing interest in our applications and have formulated some experimental paints that indicate they can match the performance we are obtaining with our paints. However, it must be stressed that from our investigations only a few conventional vinyls lend themselves to hot spray.

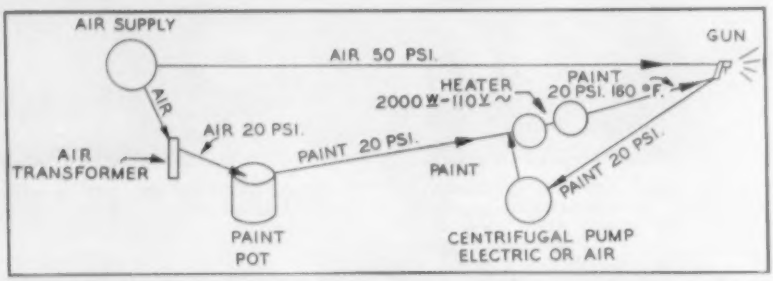
At present, we are using 10 hot-spray units, two of which are the type already described. The other eight are of the circulating type that allows the paint to circulate past the gun and through the heater when not actually spraying. This provides for more uniform temperature of the paint at the gun and consequently a more uniform job.

To sum up, some of the advantages we have gained by hot spraying of vinyl paints on over 250,000 sq. ft. to date are:

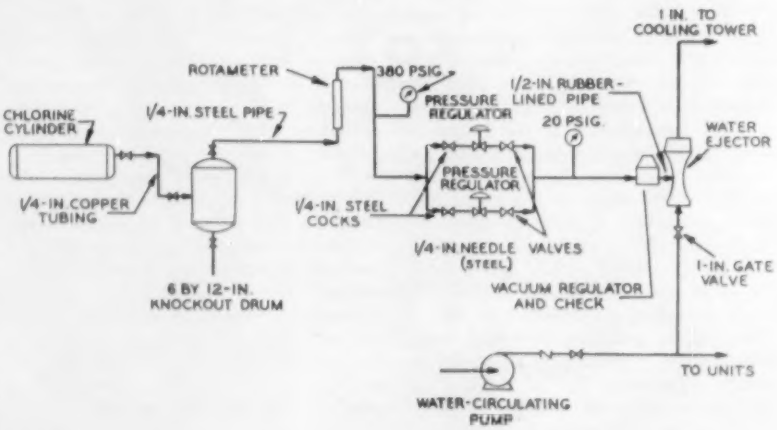
(1). More build per coat (fewer coats required). (2). No damaging drift from overspray. (3). Lower total labor cost per square foot of surface. (4) Elimination of thinners. (5). Easier application. (6). Improved working conditions for spray men. (7). Increased coverage per gallon (reduction of overspray loss). (8). Better finish. (9). Reduction of sagging. (10). Better film continuity (more dense film and better flowout). (11). A build-up of film thickness on the edges of the work.



NONCIRCULATING method of hot-spray application can be seen in this schematic. A portable, electrically heated unit is used.



CIRCULATING method of hot-spray application as diagramed here lets paint circulate through the heater when not actually spraying.



Chlorine injection—the easy way

A SIMPLIFIED chlorine injection unit can be constructed which will have a favorable degree of accuracy and which will be quite easy to maintain.

The more complicated equipment available contains numerous mixing and regulating valves, floats, gas chambers, and measuring devices to provide adequate and accurate injection into the return water line to cooling tower basin.

The simplified system uses a plastic jet in the return water line and feeds chlorine into the venturi section at the point where a vacuum is created. Thus the problem of water's backing up into the chlorine line is minimized.

Method suggested by Louis L. Edmonston and Elmo C. Lacour, Jr., instrument men; courtesy Esso Standard Oil Co., Baton Rouge, La.

by Louis J. Murphy

Charts for Simplifying Sucker-Rod Analyses—2

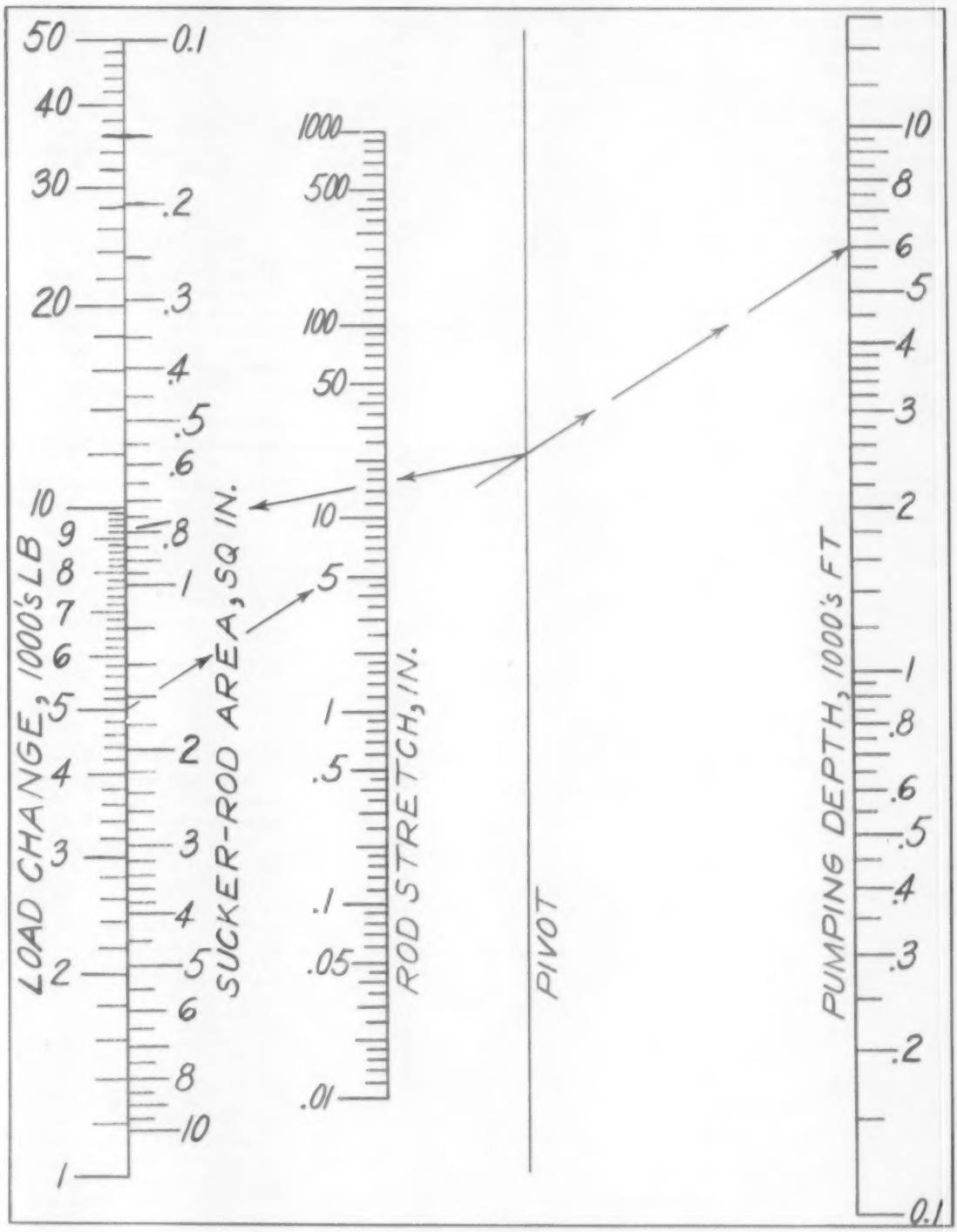


Fig. 1

by W. L. Nelson
Technical Editor

QUESTIONS ON TECHNOLOGY

Carbon-Black Yields by Various Processes

"What are the yields by various carbon-black processes?"—G. L. D.

Yields by the channel process seem to be in the range of 1.9-2.2 lb.[2 3] per 1,000 cu. ft. of gas whereas yields of 7-10 lb. per 1,000 cu. ft. are reported[2 3] for the furnace process when handling (mainly) gas. The latest furnace plants expect yields[1 2 3] of 12-17 lb. per M.c.f. These figures are somewhat substantiated by average yields obtained from U. S. Bureau of Mines statistics:[4]

	Gas used, billions of cu. ft.	Value of gas, cents per M.c.f.	Liquids used, millions of gallons	Yields, lb. Per gallon	Yields, lb. Per M.c.f.[5]
1940					1.94
1947	481	4.73	45	3.11	
1948	428	4.76	72	2.86	
1950	411	4.79	108	3.02	2.57
1951	426	5.21	182	2.96	

Because of the fact that both oil and gas are often used together, it is almost necessary to state yields as percentage of carbon recovered. On such a basis, yields are somewhat as follows:[6-8]

Feed stock—	Per cent of carbon in fuel
Channel:	
Gas	1-6
Distillate and gas	10-50
Furnace:	
Gas	10-30
Oil and gas	20-65
Coal distillate and gas	30-60

Table 1 indicates the ranges of yields of carbon black, based on the above percentage yields and upon common feed stocks.

The effect of type of charge stock cannot be expressed for all processes, but Fig. 1 indicates for one process, the relationship of characterization factor to yield of carbon black. In this particular operation, it was necessary for the oil to be completely vaporized, and the discrepancies in Fig. 1 may be due, in part, to difficulties with vaporization.

TABLE 1—RANGE OF YIELDS OF CARBON BLACK—APPROXIMATE

Feed stock—	Pounds carbon in feed stock (M.c.f. or lb.)	Channel process Lowest	Channel process Highest	Furnace process Lowest	Furnace process Highest
		Yields—Pounds per M.c.f.			
20 M.W. gas	15.0	0.3	0.90	1.8	
30 M.W. gas	24.0	0.5	1.44		
40 M.W. gas	32.5	0.65	1.95		
50 M.W. gas	41.0	0.82	2.46		12.3
500° F. Mid-B.P. oil:		Yields—Pounds per Gallon			
11.5 C.F.	7.14	0.71	2.14	1.43	4.6
10.0 C.F.	8.32	0.83	2.5	1.66	5.4
600° F. Mid-B.P. oil:					
11.5 C.F.	7.36	0.74	2.21	1.47	4.8
10.0 C.F.	8.49	0.85	2.54	1.70	5.5

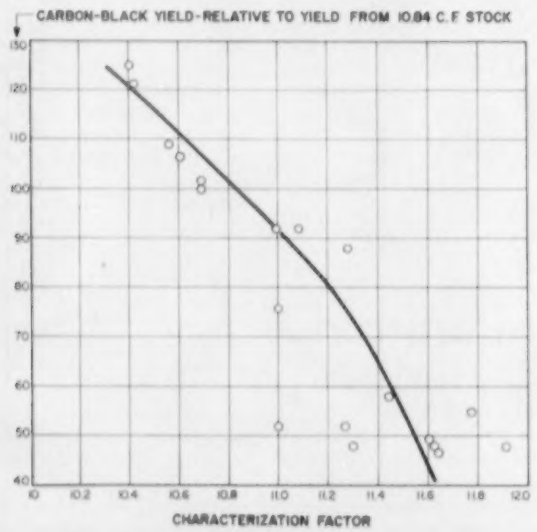


Fig. 1—General effect of characterization factor on yield of furnace black—by one process.

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Components Of Gasoline

"How much straightrun and how much cracked gasoline is found in a regular gasoline?"—W. P. S.

The composition of gasoline varies widely from plant to plant depending on the refining facilities that are available at each refinery. However, for one large operator, the components (1949) were about:

	Per cent
Straightrun (light)	35.5
Thermal cracked:	
Reformed	30.0
From gas oil	7.5
Viscosity breaking	8.5
Catalytic	17.0
Polymer	1.5

In areas where natural gasoline is available, it too would be used.

This breakup checks reasonably well with the kinds of processing equipment now in operation in refineries *(see "Most Important Refining Process," this page, November 15, 1951, p. 163).*

by
Dr. R. F. Nielsen

UNSTEADY-STATE FLOW IN GAS RESERVOIRS—4

Linear Case With Constant Pressure at Outflow End

THE linear case with constant pressure at one face, which may be an outflow or inflow face, has been solved by Aronofsky and Jenkins[1] for infinite and finite lengths. Reservoir is initially at a uniform pressure p_o and a constant higher or lower pressure is suddenly imposed on one end. Pressure distributions are given in terms of the pressure drop (or rise) relative to that at the open end. If p_o is the initial pressure, p_1 the pressure at the open end, and p the pressure at some point, the relative pressure drop (rise) P is:

$$P = (p - p_o)/(p_1 - p_o) \quad (1)$$

Distributions were calculated for a series of values of $N = p_1/p_o$ from 0.1 to 10, flow being **into** the reservoir if N is greater than unity. For the **infinite case,** P is plotted against a dimensionless ratio R defined by:

$$R = x\,[f\mu/(4\,p_o K t)]^{1/2} \quad (2)$$

where, taking practical units: x = distance in feet from open end; f = fractional porosity; μ = viscosity in cp.; p_o = initial pressure, psia.; K = permeability in perms (6.3 times perm. in darcies); t = time in days.

A replot of some of the calculations is shown in Fig. 1.

Flow rate at any time is given in terms of a dimensionless factor F:

$$F = [q/(1 - N)]\,[\mu t/(p_o K f)]^{1/2} \quad (3)$$

where q is the efflux (intake) rate in cubic feet per day corrected to the initial pressure and temperature. A plot of F vs. N is shown, the equation of which is approximately:

$$F = 0.18 \text{ for } N < 0.1$$

$$F = 0.18 + 0.12 \log^2 (10\,N) \text{ for } N > 0.1 \quad (4)$$

Calculations of pressure distributions were made for a series of **finite** values of N. For each value of N a set of curves is given showing P as a function of reduced distance x/L (L = length of the system) at various reduced times T. The reduced time is:

$$T = (K p_o t)/(f \mu L^2) \quad (5)$$

The complete set of curves was calculated for maintenance of the initial pressure p_o at x = L, and for the system being closed at x = L. As long as the transient boundary has not reached the other end (x = L) the pressure distribution can be calculated from that for the infinite case. After it has reached the other end, if the initial pressure is maintained there, the distribution will eventually become "steady state," that is, the square of the pressure will vary linearly with distance.

Fig. 2 shows the reduced drop P at x/L = 0.5 as a function of T for various values of N, when p is kept at p_o at x = L. Thus P = 1 at x = 0, and P = 0 at x = L. The extrapolation to steady state (T = ∞) for P at x = L/2 is shown on the right-hand ordinate. The dotted line shows when the transient boundary, beyond which the pressure change has not been "felt," has just reached distance L. Fig. 3 gives P as a function of T at x = 0.5 L and at x = L, when the system is closed at L. The time required for the transient to just reach L is the same as in Fig. 2.

Numerical example . . . Assume a closed linear reservoir, 20,000 sq. ft. cross-sectional area, 3,000 ft. long, f = 0.18, K = 1.2 perms, μ = 0.015 cp., p_o = 1,500 psia., temperature 610° R. Near one end the pressure is suddenly dropped and maintained at 750 psia. by a row of wells. Find: (a) how long before the transient boundary reaches the other end; (b) the pressure at x = 1,500 and x = 500 and the efflux rate at this time; and (c) how long before the pressure is 1,350 psia. at the closed end.

Solutions . . . N = 750/1,500 = 0.5.

(a) In Fig. 2 the dotted line intersects the N = 0.5 line at T = 0.078. From Equation 5:

$$T = \frac{1.2 \times 1{,}500 \times t}{0.18 \times 0.015 \times 3{,}000 \times 3{,}000} = 0.074\ t$$

Whence t = 0.078/0.074 = 1.05 days.

(b) When x = 1,500, x/L = 0.5, and at T = 0.078, P = 0.14 from Fig. 2, or (p — 1,500)/(750 — 1,500) = 0.14, so p = 1,395 psia. To find the pressure at x = 500 we find R from Equation 2:

$$R = 500\,[(0.18 \times 0.015)/(4 \times 1{,}500 \times 1.2 \times 1.05)]^{0.5} = 0.3$$

At R = 0.3 and N = 0.5 on Fig. 1, P = 0.6 or p = 1,050.

From Equation 4, F = 0.24 for N = 0.5 and from Equation 3:

$$q = 0.24\,(1 - 0.5) \times [(1{,}500 \times 1.2 \times 0.18)/(0.015 \times 1.05)]^{0.5} = 17.2$$

whence the efflux is $17.2 \times 20{,}000 \times 1{,}500 \times 520/14.7 \times 610 = 30$ M.M.s.c.f.d.

(c) When p = 1,350, P = 0.2 from Equation 1. From Fig. 3, when P = 0.2 at x = L and N = 0.5, T = 0.25, so t = 0.25/0.074 = 3.3 days.

Author is associate professor of petroleum and natural-gas engineering, Pennsylvania State University.

Reference

1. Aronofsky and Jenkins, Proc. First U. S. Congress of Applied Mechanics, 1951.

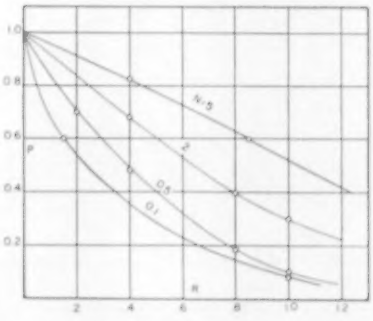

Fig. 1—Reduced pressure drop P as a function of dimensionless ratio R for infinite length.

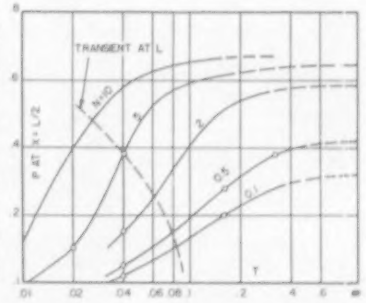

Fig. 2—Reduced pressure drop at midpoint as function of reduced time, initial pressure maintained at L.

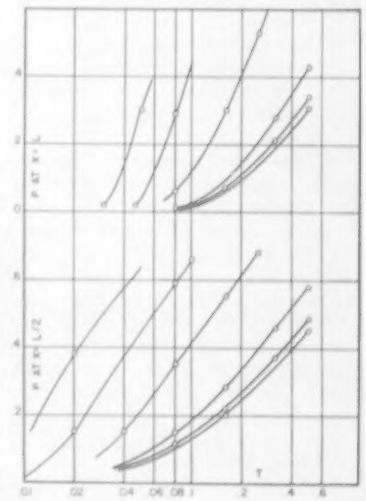

Fig. 3—Reduced pressure drop at midpoint as function of reduced time, system closed at L.

ELECTRIC LOGGING—45

Choosing Correct Values for Applied Potential

by R. I. Martin

SOME difficulty may be experienced in choosing for selective S.P. logging the correct values for the applied potentials. When errors are made, results are obtained as shown in Fig. 1. Both curves give deflections at the level of both permeable zones and shales so that an interpretation is not readily possible.

In this case it is necessary to make calculations to obtain the computed static S.P. curve shown on the left. When Curves 1 and 2 are close together, the static S.P. cannot be calculated accurately, and these parts are shown with broken lines. Also when the selective S.P. curves go off scale, no determination can be made so that the computed curve is interrupted accordingly.

The static S.P. curve may be computed by means of the relation:

$$E = M\,[A/(B - A)] \qquad (25)$$

where:

E is the computed static S.P. in millivolts

M is the total modulation in millivolts

A is the deflection in a negative direction from the base line

B is the deflection in a positive direction from the base line.

A possibility offered by this electrode arrangement is that of recording the static S.P. directly.

If the device is located opposite a thick conductive bed, the potentials at M and G—G′ are both equal to the static S.P. of the bed, if no current is passed through A—A′. The procedure for recording the static S.P. consists of adjusting the monitoring current so that the potential difference between M and G—G′ is kept equal to zero as the device is moved along the hole. The common potential at M and G—G′ is recorded and is the value of the static S.P.

The reason for this is as follows: It is clear that in the case just mentioned (of a thick bed), the static S.P. is attained and may be recorded. In the case of a thin conductive bed between thick, highly resistive formations, and if no current is sent through A—A′, a difference in potential will occur between M and G—G′. The potential at M may be negative, for example, with respect to G—G′. If a current is sent through A—A′ such that the potentials at M and G—G′ are made more negative, the potential at M is less modified than the potential at G—G′. The potential difference between M and G—G′ decreases, and the current from A—A′ can be adjusted until this difference becomes equal to zero. At this moment, both M and G—G′ are brought to the same negative potential which is equal to the static S.P. of the bed.

A corresponding sequence of events will take place if the potential at M were positive with respect to that at G—G′, before any current is passed through A—A′.

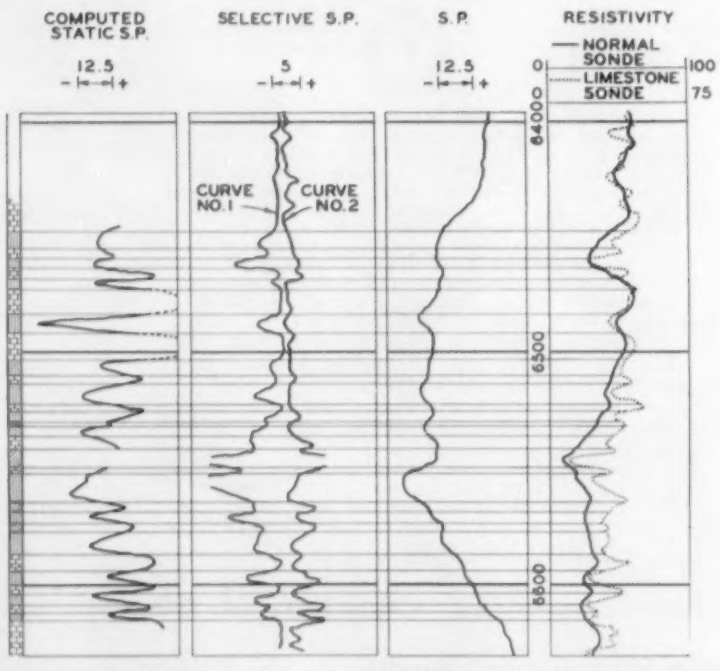

Fig. 1—Interpretation of the curves is not readily possible because of errors in selecting correct values of applied potentials.

Author is assistant professor of petroleum engineering, Missouri School of Mines and Metallurgy.

How to Design In-Tank Jet Mixing Systems—10

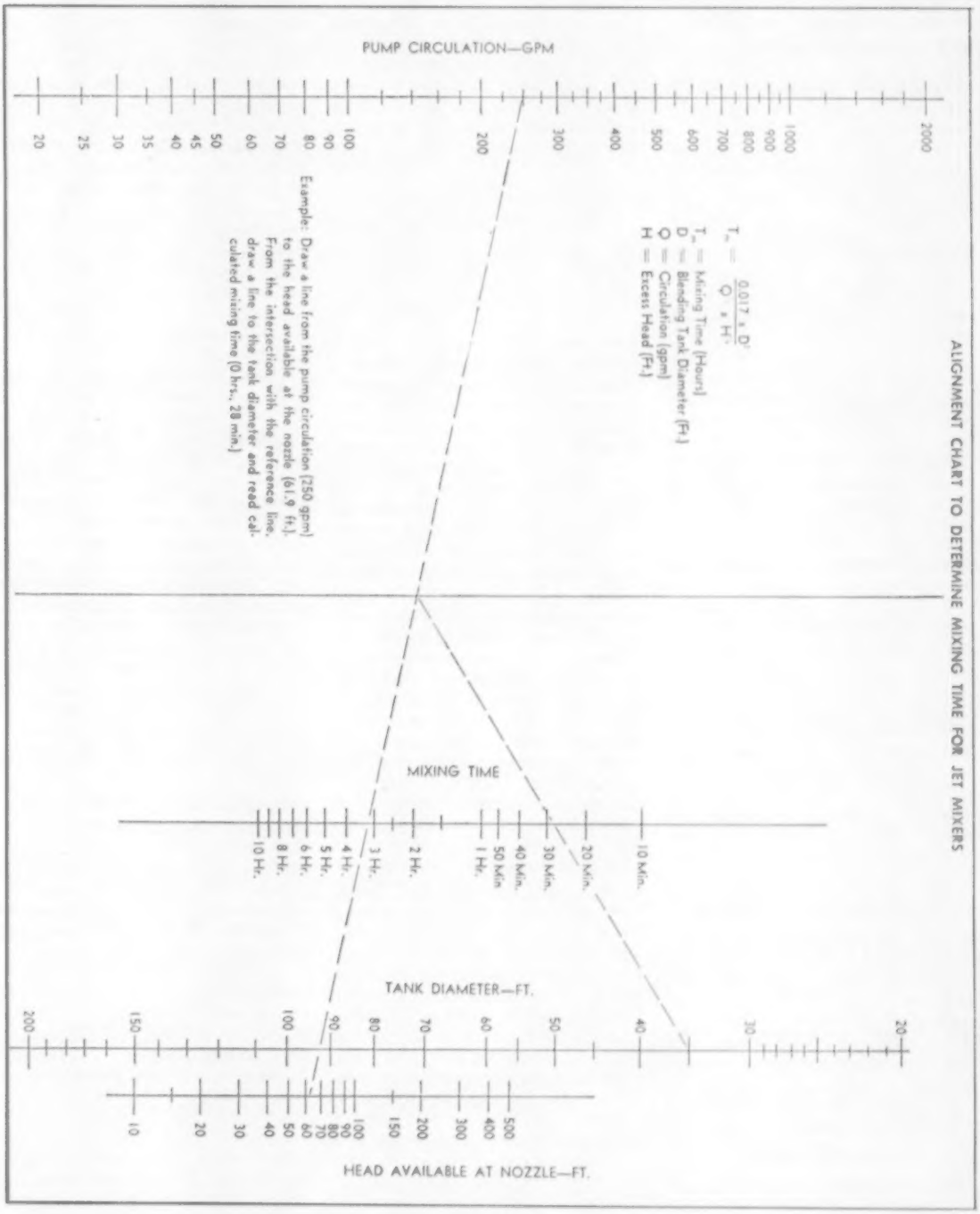
PUMP CIRCULATION—GPM
20 25 30 35 40 45 50 60 70 80 90 100 200 300 400 500 600 700 800 900 1000 2000
Example: Draw a line from the pump circulation (250 gpm) to the head available at the nozzle (61.9 ft.). From the intersection with the reference line, draw a line to the tank diameter and read calculated mixing time (0 hrs., 28 min.)
$T_m = \frac{0.017 \times D^3}{Q \times H^2}$
T_m = Mixing Time (Hours)
D = Blending Tank Diameter (Ft.)
Q = Circulation (gpm)
H = Excess Head (Ft.)
MIXING TIME
10 Hr. 8 Hr. 6 Hr. 5 Hr. 4 Hr. 3 Hr. 2 Hr. 1 Hr. 50 Min. 40 Min. 30 Min. 20 Min. 10 Min.
TANK DIAMETER—FT.
200 150 100 90 80 70 60 50 40 30 20
10 20 30 40 50 60 70 80 90 100 150 200 300 400 500
HEAD AVAILABLE AT NOZZLE—FT.
ALIGNMENT CHART TO DETERMINE MIXING TIME FOR JET MIXERS

Fig. 6

This material from E. I. du Pont de Nemours & Co., Inc.

by T. E. Raper

FIELD PROCESSING
NATURAL GASOLINE . . . REFINING

How to Do a Safer Job of Loading—2

SAFETY rules and regulations should be posted to keep loaders and truck drivers informed of the procedure for loading tank trucks. Here are some rules and regulations that Warren uses in loading operations:

1. The loader shall see that all truck papers and tank-capacity gages comply with state and I.C.C. regulations.
2. No smoking, open lights, or flames permitted at any time in the loading area.
3. Maintenance or repair work on vehicles shall not be permitted while loading is in progress.
4. Loader shall remain in attendance at all times during the loading operations, except during the auxiliary operations connected with loading.
5. Loader shall see that driver properly spots truck, sets brakes, shuts off engine, radio, and lights and leaves cab.
6. Loader shall place wheel chocks in front and back of rear wheels.
7. Loader shall fasten ground devices to clean, unpainted surface of the tank to provide metal-to-metal contact.
8. Loader shall make all hose connections.
9. Loader shall recheck all hose and ground connections before opening valve and starting pump.
10. Loader shall set gaging devices not to exceed maximum permitted volume, then proceed to load.
11. Loader shall be responsible for adding of odorant when required.
12. Loader shall, if leak develops, shut down operations and make repairs before proceeding with loading.
13. Loader shall, after loading is completed, close valve and bleed pressure from hose before disconnecting.
14. Loader shall disconnect hose and ground devices and remove chocks.
15. Loader shall give driver clearance for safe removal of truck.

Tank-Car Loading

To ship bulk quantities of natural gasoline and L.P.G. by rail, special tank cars must be used. The tanks for liquefied petroleum gases are of sturdier construction and differ in other respects from the ordinary gasoline tank cars. The class of these tank cars and the service for which they are generally used are:

Class—	Psi. Test pressure	Psi. Pressure set at	Designated for
104A	100	75	Butanes
105A300	300	225	Propane
105A400	400	300	Propane
10A500	500	375	Propane
10A600	600	450	Ethane-propane

Tank cars . . . The 105A differs from the 104A in that the tank is of forged welded instead of riveted construction. All tank cars of the 104A and 105A class are insulated with 4 in. of cork. There is no expansion dome on any of these cars and all connections for loading, including safety valves, gaging, and temperature devices are attached to a manhole cover under a protected strong house at the top center of the tank.

The capacity of these cars is more than the ordinary gasoline car, most of them being 10,000 to 11,000 gal. Although it is possible to put more in a larger designed car (since the maximum quantity of L.P.G. allowed in one tank is 60,000 lb. or approximately 12,000 gal. of butane) this would allow construction of a tank car of about 13,500-gal. capacity. But the required shell thickness and general construction for such a large car makes the cost prohibitive in view of the small increase in gallons.

Every tank must be tested before being put into service and every 2 years or less after the original test. The original test must be carried out before lagging is applied by completely filling with water or other liquid of similar viscosity of a temperature which must not exceed 100° F. during the test. The tank must hold the pressure for at least 10 minutes for Class 104A and 30 minutes for Class 105A without leaking or evidence of distress.

Manway Arrangement

There are three 2-in. angle valves. The two on the longitudinal center line of the car are connected with 2-in. eduction tubes. All openings except the safety valve are protected with excess-flow valves. This includes both the slip tube, gaging device, and the sampling connection which runs close to the bottom of the tank.

Thermometer well . . . This is made of ¾-in. pipe and extends to within 18 in. of the bottom of the tank. There are two types. One is a flange type, the other screws into the dome flange from the bottom. The slip-tube housing is welded into the bottom of the dome flange. It is equipped with ¼-in. check and extends aproximately 25 in. off the bottom of the tank.

There are several types of slip-tube control valves. At Warren we prefer a needle-angle valve. It is simple to operate and should always be plugged after the car is loaded.

The safety valve is located in the center of the dome. This is spring loaded, with metal-to-metal tapering seats. To assure leakproof operations, it has an additional, replaceable, composition gasket or O ring that can be tightened or replaced from the outside in case of leakage. The valve is factory set and pressure cannot be changed without removing the valve from the tank car. On I.C.C. 104A cars, safety valve will pop at 75 psi. On I.C.C. 105A300 cars, the safety valve will pipe at 225 psi.

Making check . . . A thorough check should be made on the thermometer well, relief valve, sampling valve, vent, and loading and unloading valves before loading the car. This will save a lot of headaches for the loader and eliminate the possibility of outages upon arrival at destination. Most of these devices require only minor repairs, and adjustments can be made safely by the loader. If the safety valve leaks before or after loading, the gasket can be safely changed and stop the leak. One type of safety valve has a lifting eye on top. The other has a square nut and a lock nut. To change gasket or O rings, merely remove the lifting eye and nut, raise the gasket retainer, and replace either the gasket or the O ring as the case may be. Do not rotate the safety-valve stem.

Author is with Warren Petroleum Corp. at Maysville, Okla. Paper presented at N.G.A.A. meeting, Oklahoma City, September 17, 1954.

REFINING

Expansion Studied

Frontier Refining head says projects are being outlined

SIDNEY, Neb. — Frontier Refining Co., operator of a 14,500-bbl. per day refinery at Cheyenne, is considering several expansion and improvement projects, it was disclosed here during dedication ceremonies of the Wyoming-Nebraska Pipeline Co.'s new products line from Cheyenne to North Platte, Neb.

M. H. Robineau, president of both the refining company and the pipeline, said Frontier's policy is "to continue to expand."

"We have enlarged our operations in Cheyenne from less than 1,000 bbl. throughput per day to almost 15,000 bbl. Frontier is the largest independent refinery in the Rocky Mountain region and now that the Wyoming-Nebraska pipeline is completed, there will be an even greater market for Cheyenne manufactured products.

"Several new expansion and improvement projects are on the drawing board and these will be announced as soon as they are completed."

The new 6-in., 215-mile line was designed to move 8,000 bbl. daily of products from Cheyenne to Sidney and 6,000 bbl. daily from Sidney to North Platte. However, the line has been checked for a maximum future capacity of 12,000 bbl. daily.

Frontier also has made an agreement with Wyco Pipeline Co. to use Wyco's products line from Casper, Wyo., via Cheyenne to Denver *(The Oil and Gas Journal, August 2, page 62)*. This agreement gives the Cheyenne refinery an outlet into Colorado.

Storage facilities along the new line include a 142,000-bbl. terminal at North Platte and a 51,000-bbl. terminal at Sidney.

Big Unit Going Up

Canada's tallest Houdriflow tower rising at Montreal

MONTREAL.—Canadian Petrofina, Ltd.'s refinery here is being equipped with the tallest Houdriflow catalytic cracking tower ever built in Canada.

The tower, when completed, will be 285 ft. high with a maximum diameter of 24 ft. It is being fabricated in sections and trucked to the plant site. Lummus Company Canada, Ltd., is general contractor for the plant, but Canadian Vickers, Ltd., is building and erecting the big Houdriflow unit.

A giant guy derrick—the highest ever used on the North American continent—has been shipped from Lingen, Germany, to lift the sections in place. The derrick is 425 ft. high. The 215-ft. mast and boom pivot on a tower of open girder construction, 210 ft. high and 84 in. sq.

The derrick was developed by the West German firm of MAN for use in erecting another Houdriflow unit at Lingen. The derrick is capable of lift-

NELSON REFINERY CONSTRUCTION INDEX

Appears on the Refining page in the first issue each month.
Compiled by W. L. Nelson, petroleum refinery consultant, Tulsa.
The Index was explained July 7, 1952 (page 105) as well as the Indexes of Individual Items of Equipment that appear on the Cost-imating page in the first issues of the months of January, April, July, and October.

INDEX (1946 = 100)

	1948	1950	1951	1952	1953	Aug. 1954
Pumps, compressors, etc.	127.0	138.2	155.9	155.6	162.5	166.6
Electrical machinery	127.6	134.9	154.3	154.2	156.4	159.4
Internal-combustion engines	116.9	126.0	146.1	146.5	148.1	150.6
Instruments	120.0	127.8	142.3	146.2	151.8	153.9
Heat exchangers	130.0	140.0	152.0	165.8	174.9	166.4
Miscellaneous equipment average	*122.1	*126.2	*145.1	153.3	158.8	159.4
Materials component	139.3	149.5	164.0	164.3	172.4	175.2
Labor component	128.0	144.0	152.5	163.1	174.2	184.7
Nelson construction index	132.5	146.2	157.2	163.6	173.5	180.9

*Used in computing the Nelson Index until April 1952. These are slightly different than the average of the Miscellaneous Equipment Items shown above.

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ing 80 tons a height of 400 ft. The maximum load expected on the Canadian job is 67 tons. The derrick is guyed to four concrete deadmen 17 ft. sq. Three winches anchored in each deadman maintain a tension of 10 tons on each guy.

Work also is well under way on a gas plant and hydrodesulfurization unit being constructed at the refinery. The refinery is expected to be completed in mid-1955.

Additives Aid Resid Fuel

NEW YORK. — Adding additives holds promise of insuring the trouble-free burning of residual fuel oil, a Swiss research engineer told the annual meeting of the American Society of Mechanical Engineers in session here.

P. T. Sulzer, of Sulzer Brothers, Ltd., Winterthur, Switzerland, based his paper on studies and investigations conducted in Switzerland and on Swiss and American reports on the subject. The paper covered the formation of deposits from residual fuels.

Sulzer described results of tests at the semiclosed cycle, 20,000 kw. gas-turbine plant of the North East Swiss Power Co. in which residual fuels were burned with and without additives.

"Very favorable results were obtained by adding a suspension consisting mostly of aluminum silicates. The total running time, using treated fuels, was 2,200 hours. During all this time, it was not found necessary to clean the turbine."

Gasoline De-Icer Offered

CHICAGO.—A new gasoline additive which prevents ice forming in the average car's fuel system at 20° below zero is going into gasoline marketed by Standard Oil Co. (Indiana) service stations in the Midwest.

The new additive joins one already in use that is designed to prevent motor stalling due to carburetor icing.

Standard did not identify the new additive, but said it works on the same general principle as radiator anti-freeze. The de-icing agent dissolves in water to form a solution with a much lower freezing point than water.

Maintenance in Limelight

CHICAGO.—Refinery maintenance problems will come under close scrutiny here January 24 through 27 at the sixth annual Plant Maintenance and Engineering Show at the International Amphitheater.

A number of the 37 conference sessions scheduled for the show will be devoted to special problems faced by refineries.

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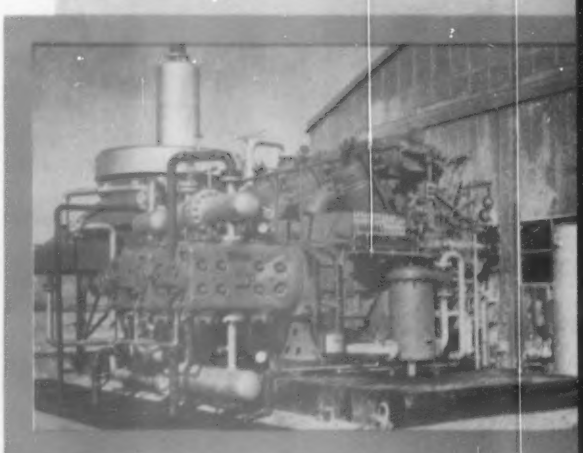

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Among the Drilling Contractors

Cimarron Western Starts 20-Well Wildcat Program

Cimarron Western Drilling Co., drilling subsidiary of Beach & Talbot, Tulsa independent operating partnership, is embarking, in conjunction with Ryan-Davis Oil Co., on a 20-well wildcat drilling program in the Denver-Julesburg basin. It acquires a portion of the working interest in the projected wells for the drilling.

The wells will be drilled with a Mayhew 3000 rig, equipped for "slim-hole" drilling, and recently moved into the area. The first well, designated as Ryan-Davis Oil Co. and Cimarron Western Drilling Co. 1 Fernquis, is northwest of Bethel, in northeastern Kimball County, southwestern Nebraska. Location, in the SW SW NW 4-16n-53w, is near the Banner County line, to the north. Projected depth is 5,400 ft.

The new few tests will be located in the immediate area, after which the rig will be moved to successive locations gradually southward across the basin.

Cimarron Western has had another slim-hole rig, an Ideco H-25, operating in the Denver-Julesburg basin. It now is on its thirteenth wildcat test drilled for Shell Oil Co. It also has two rigs in Weston County, Wyoming, in the Powder River basin. Currently, these are under contract to Sapphire American Petroleums, Inc., in the Black Thunder area, where production is being developed in the 7,400-ft. Newcastle sand.

In addition, a sister company, Cimarron Drilling Co., has two rigs operating on contracts in southern Oklahoma. One, an Unit 34, is on Weimer-Fitzhugh and Cimarron Drilling Co. 1 Nolan, a 5,400-ft. Goddard sand test in 18-3s-2e, Carter County; and the other, an Ideco H-35, is on the same operators' 1 Graham, a 6,000-ft. Deese sand test in 1-1n-6w, Stephens County.

O. W. Killam, Laredo, Tex., has a new contract operation under way in northwestern Jim Hogg County, Southwest Texas. It is a wildcat test, 1 Hellen, being drilled for Konrad W. Maxwell, also of Laredo. Location is 5 miles northwest of Hebbronville.

L & W Drilling Co. is drilling on a contract with Blair & Vreeland, Corpus Christi, at a wildcat location in Porcion 95, in Starr County, Southwest Texas. The test, 1 Amado Vera estate, is projected to 6,200 ft.

Richardson & Stewart Drilling Co., San Antonio, is under contract to Arkansas Fuel Oil Corp. for a deep wildcat test to be drilled at 1 Lirette Unit, 2½ miles north of Hollywood field, near Houma, in Terrebonne Parish, coastal Louisiana.

Greyhound Drilling Co., Shreveport, has a rig working for North Central Texas Oil Co. and Crow Drilling Co., Inc., also of Shreveport, at a wildcat

Powell Drilling Co., Wichita, is keeping a rig running under contract to The Texas Co. in Schmied field, Graham County, Kansas. Shown at the rig on a recently drilled well are: (Top row, left to right) R. L. Prochaska, contract representative, Dufek Oilwell Service Co., Plainville, Kans.; A. L. Thompson, Powell tool pusher and day-tour driller; T. J. Harp, evening-tour driller; G. R. Muelluh, A. J. Goens, and E. L. Mickelson, crewmen; and (kneeling, same order) Roy Taucher, Roy J. Huffman, and Glenn Honas, crewmen.

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location 3½ miles southwest of Spearsville, in Union Parish, North Louisiana. Hole is projected to around 5,000 ft. for a look at the Travis Peak formation. Test is at 1 First National Bank of El Dorado.

Blanton Drilling Co., Houston, is drilling on a projected 10,300-ft. wildcat test 12½ miles northwest of Bellville, in Austin County, Texas Gulf Coast. It is a contract job for Dakamont Exploration Co. The well is the latter's 1 Wiese et al., spotted in the S. F. Austin League 4.

Kelly Brothers Drilling Co. has a rig on an outpost location north of production at Big Creek, in Fort Bend County, Texas Gulf Coast, where it will drill a projected 7,000-ft. test for Fred W. Shield and General American Oil Co. Location is for L. T. W. Davis estate, in the J. J. Dickerson Survey.

A **Berg & Buck Drilling Co.** rig is on a wildcat test Powel Briscoe, Jr., & Co., of Oklahoma City, is putting down in southeastern Logan County, Oklahoma. Location is at 1 Briscoe, in 29-15n-1e, near the Oklahoma County line. Hole will be carried to 4,500 ft.

Lone Star Drilling Co., Arp, Tex., now drilling for H. J. Heartwell, of Fort Worth, at a rank wildcat location 2 miles north of Washington, in Hempstead County, southwestern Arkansas, has contracted with J. M. DeuPree, of Mineola, Tex., for a 3,000-ft. test to be drilled about 1½ miles to the south. Rig, now on the Heartwell job, will be used.

Exploration Drilling, Inc., Dallas, is under contract to Olin Oil & Gas Corp., of Shreveport, for a 3,400-ft. Travis Peak test on the east side of Sandy Bend field, Union County, Arkansas. Location is for 1 Norris, in 8-18s-12w. Production in the area is from the shallower Nacatoch sand.

Woolf & Magee, Tyler, Tex., will drill a 5,000-ft. Wilcox test about a mile southwest of Rosefield, in LaSalle Parish, eastern Louisiana. It is a contract job for W. C. Wentworth, of Natchez, Miss. Listing is for 1-A Louisiana Central Minerals, in 36-11n-4e.

Cook Drilling Co., Fort Worth, has a new wildcat operation under way in the Black Warrior basin of northeastern Mississippi. Contract is with Seaboard Oil Co., which has scheduled a test to the Ordovician around 7,000 ft. Location, 1 Williams, in 35-13s-1e, is about 1½ miles northeast of Vardaman, in eastern Calhoun County.

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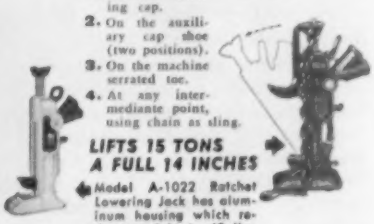

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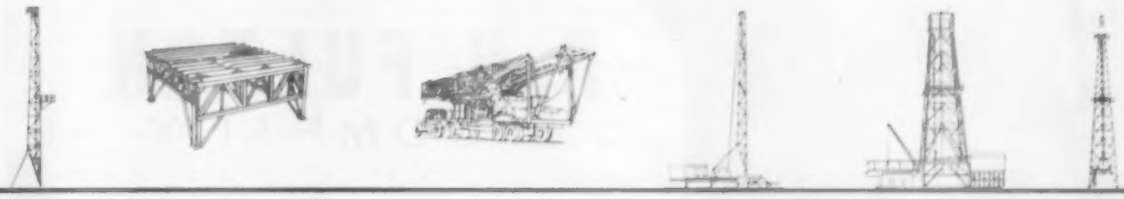

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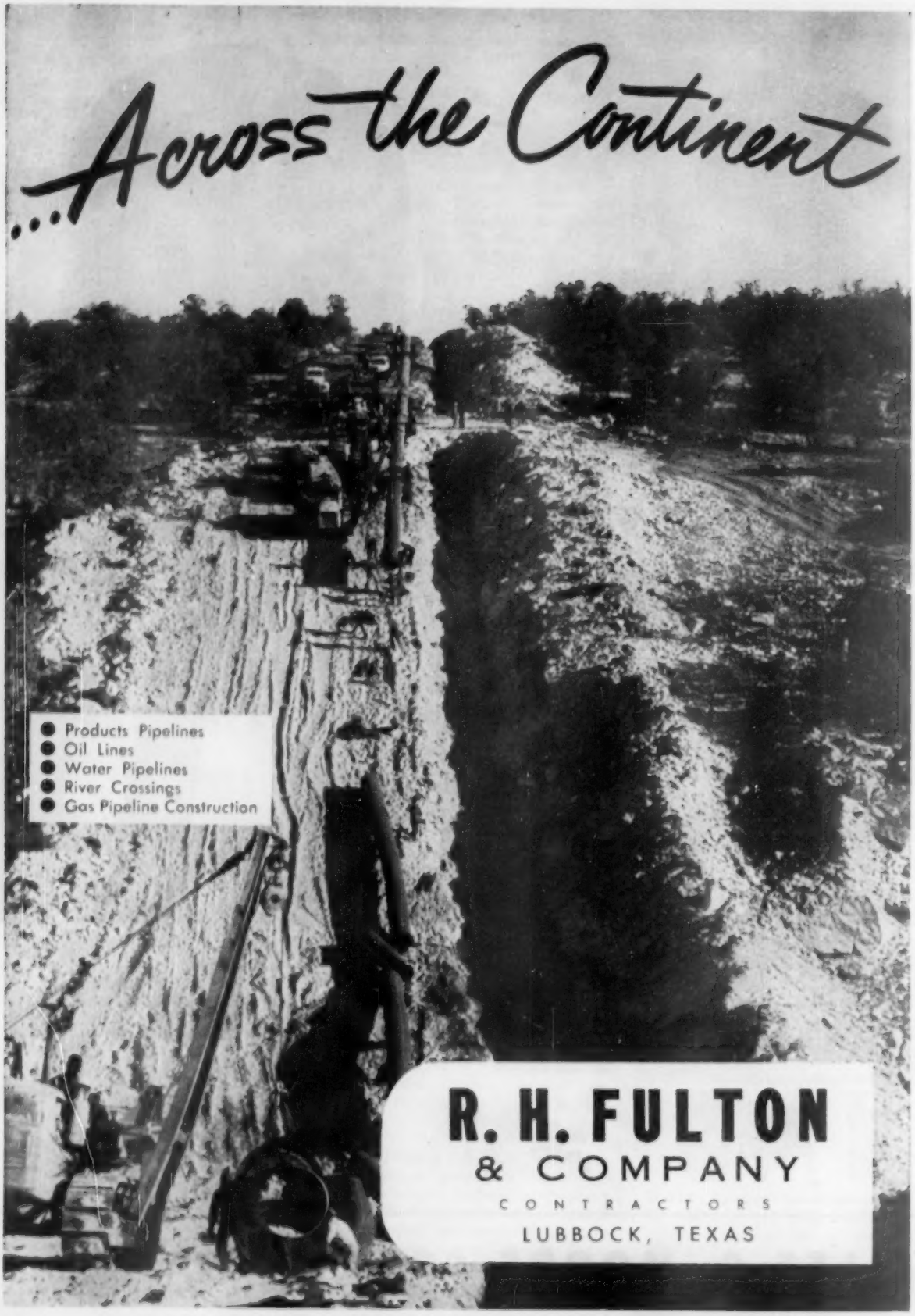
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Pipeline Patrol

. . . Report on Construction

Longest span—2,150 ft. between towers

CONSTRUCTION is now nearing completion on the longest main-span pipeline suspension bridge, which is being built for Texas Illinois Natural Gas Pipeline Co. across the Mississippi River near Grand Tower, Ill. The bridge will carry two 30-in. gas lines at a height of 75 ft. above the highest recorded level of the river. Length of the span between towers is 2,150 ft.

The main towers, shown during construction above, will be 246 ft. above their concrete supports and will support two main suspension cables composed of twelve 2-in. wire ropes. Construction on this project has been under way since September 1953, and completion is expected by March 1955. Total cost of project will be around $3,250,000.

Under Way, Contracted, and Planned

PIPELINE activity as reported below by The Oil and Gas Journal is compiled from information received from pipeline companies and contracting firms.

These projects include those planned, proposed, under way, and contracted. Uncontracted projects are indicated by a • preceding the job.

Crude-Oil Pipelines

Arapahoe Pipe Line Co.—This company owned jointly by Sinclair and Pure has let contracts on a 494-mile crude line from Merino, Colo., to Humboldt, Kans. Completion scheduled for end of year. The contracts were let in the following sections:

Section 1.—146 miles of 18-in. from Merino, Colo., to Colby, Kans. R. H. Fulton Co.

Section 2.—162 miles of 18-in. from Colby to Schurr Station, Kans., R. H. Fulton.

Section 3.—84 miles of 20-in. from Schurr Station to Burns, Kans., R. H. Fulton. Completed.

Section 4.—86 miles of 20-in. from Burns to Humboldt, Panama Williams Co. Completed.

Ar-Mex Pipe Line Co.—Company has applications for two lines before the Office of Defense Mobilization Board for rapid amortization approval.

1. A crude-oil line from Albuquerque, N. M., to Phoenix, Ariz. This line would serve a 20,000-bbl. refinery being planned by Frost & Associates of Dallas.

2. A crude-oil line from Guernsey, Wyo., to Albuquerque.

• **California-Oregon Pipe Line System.**—103 miles 6-in., proposed, Crescent City, Calif., to Medford, Ore.

Cheyenne Valley Pipe Line Co.—Company planning a 118-mile, 10-in. crude line from Cheyenne River to Fort Laramie, Wyo. Line will cost $1,838,241 and will connect with

See Composite and Refinery Catalogs, or Write for Specifications Folder

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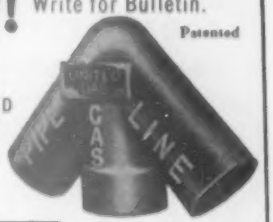

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Pipeline Patrol

the Platte Pipe Line system at Fort Laramie.

Magnolia Petroleum Co.—This company will operate a 48-mile, 12-in. submarine pipeline for itself and Continental Oil Co., and Newmont Oil Co. The line will run to blocks off the coast of St. Mary's Parish, Louisiana, and will have a capacity of 50,000 bbl. per day. Brown & Root, Houston, has the contract and expects to be finished by the middle of 1955.

Minnesota Pipe Line Co.—Williams Brothers Co. has contract to build this 260-mile, 16-in. crude line from Clearbrook to Hastings, Minn. The line, to cost $12,500,000, is the southern end of a system which will move crude from Fosterton field, Sask., to Great Northern's refinery which is building in the Minneapolis-St. Paul area. Present plans call for completion by July 1955.

• **NNCW Pipeline Co.**—127-mile line, proposed, from Weston County, Wyoming, to Casper. 108 miles of 10-in. and 19 miles of 8-in. Est. cost: $3,500,000.

Shell Pipe Line Corp.—Company has awarded Anderson Bros. Corp. a contract to lay 35 miles of 12-in. crude line from Cabin Creek field in Montana to a tank-car loading rack on the Northern Pacific Railroad near Glendive, Mont.

Standard Pipe Line Co.—Company plans to build two crude lines. Applications are now before the Office of Defense Mobilization for rapid amortization approval.

1. A 350-mile, 16-in. crude line from Glendive, Mont., to Guernsey, Wyo., to connect with Platte Pipe Line Co.'s system there.

2. A 330-mile, 16-in. crude line from Wink, Tex., to Albuquerque, N. M. This line would serve a 10,000-bbl. refinery being planned by Frost & Associates of Dallas.

• **Union Oil Co. of California.**—Planning construction of a 60-mile crude line from its Clara Valley field to its Wilmington refinery. Line is expected to be completed by late this year. 12-in. line. Bids being asked.

Products Pipelines

• **American Pipe Line Co.**—Has received ODM approval to amortize 40 per cent of $178,000,000 with a rapid writeoff on proposed line to run from Gulf Coast area to New York City area. Bids for pipe requested.

Badger Pipe Line Co.—Company to build 195 miles of 8-10-12-in. pipeline from East Chicago, Ind., to Madison, Wis. One section of 40 miles has been let to Morrison Construction Co. of Hammond, Ind. 2d section of 32 miles from Lockport to Des Plaines, Ill., let to Contract and Material Co. of Evanston, Ill.

65 miles of 12-in. from Des Plaines to Rockford let to Contracting & Material Co. Evanston, Ill.

56 miles of 12-in. from Rockford to Madison let to Mid States Construction Co. of Mount Vernon, Ill.

• **H. W. Bass & Sons, Inc.**—152 miles, 4-6-in., proposed. Duval and Live Oak counties, Texas, to Corpus Christi, Tex.

Buckeye Pipe Line Co.—This company has awarded 80 miles of 8-in. products line between Lima and Columbus, Ohio, to Sheehan Pipe Line Construction Co. of Tulsa. The line is expected to be in operation by the end of the year.

Cherokee Pipe Line Co.—Company will convert a recently purchased crude line into an aviation and jet fuel carrier from Ponca City, Okla., to Wichita. The company also plans to lay about 8 miles of line to complete the present system into Wichita. Line will serve refineries of Continental Oil Co., and Cities Service Oil Co., joint owners of Cherokee.

Inland Corp.—Company owned jointly by Standard Oil Co. (Ohio) and Shell Oil Co., will construct a 38-mile, 10-in. products line from Toledo to Fostoria, Ohio. Line expected to be in operation by January 1955.

Company also planning 51-mile, 8-in. line from Fostoria to Lima.

• **International Pipe Line, Inc.**—132 miles 8-in., proposed, Wrenshall to Minneapolis, Minn. Cost: $4,200,000.

Malco Pipeline, Inc.—Company planning to build a 91-mile, 6-in. products line from its Prewitt, N. M., refinery to Albuquerque.

Moore Stoner Co.—Company has $2,500,000 tax amortization for a 200-mile, 6-in. products line from a connection with Oil Basin Pipe Line Co.'s terminal at Glendive, Mont., to Minot, N. D.

Shell Pipe Line Corp.—65 miles of 12-in. products line from Baton Rouge, La., to Shell's Norco refinery. Houston Contracting Co. has contract. H. T. Muckley, Supt. Job held up indefinitely by right-of-way difficulties.

Standard Oil Co. of Texas.—Company laying a 248-mile, 6-in. products line from El Paso to Albuquerque. The line will move 5,000-bbl. daily when finished and will cost $4,000,000. Houston Contracting Co. has job.

• **Sunflower Pipe Line System.**—Company proposes to build a 215-mile, 6-in. line to transport LPG from six counties in western Kansas to Wichita. Application approved by Kansas Corporation Commission.

Texas Eastern Transmission Corp.—Company has asked FPC permisison to abandon "Little Inch" gas line. If permission is granted, company will spend $71,000,000 converting the line to a products line with a capacity of 235,000-bbl. per day.

U. S. Gov't. Alaskan Products Pipe Line.—600 miles of 8-in. under way from Haines northward through Yukon to Fairbanks, Alaska. Williams Bros., McLaughlin, Inc., and Marwell Construction Co. are doing the work. Pipe laying will be through by November of 1954; however, entire job not expected to be completed until September of 1955.

Natural-Gas Pipelines

• **American-Louisiana Pipe Line Co.**—1,121 miles of 30 and 22-in., 30-in., proposed, extends from North Tepetate, Acadia Parish, Loupisiana, to near Detroit. The 22-in. starts near Payne, Ohio, extends to Bridgman, Mich. Estimated cost: $130,000,000. FPC approved.

• **Arkansas Louisiana Gas Co.**—136 miles of new line proposed, to be added to present system in Arkansas, Louisiana, and Texas. Estimated cost: $9,245,166. FPC approved.

• **Carolina Natural Gas Corp.**—185 miles, 2-12-in., proposed, later lines off Transcontinental in North and South Carolina.

• **Central Hudson Gas & Electric Corp.**—Company has filed application with FPC to construct 48 miles of 12-in. line from Albany to Kingston, N. Y. Line will be started and completed in 1955 if FPC approves.

Chicago District Pipe Line Co.—19 miles of 36 and 30-in., completed of 35 miles planned. Remainder, all 30-in., will be completed in 1954.

• **City of Dalton, Ga.**—Proposes to build 39 miles of 8-in. from a point of interconnection with Southern Natural's Rome-Calhoun transmission line. Estimated cost: $2,940,000.

• **City of Fayette, Ala.**—20 miles, 5-in., F.P.C. approved, Fayette, Ala., to Southern Natural's system in Tuscaloosa County, Alabama. Completion set for early 1955.

• **Colorado Interstate Gas Co.**—365 miles, 22-in., approved by F.P.C., Green River, Wyo., to Denver, Colo., 1954.

• **Colorado-Western Pipe Line Co.**—454 miles of undetermined size pipe planned between Cortez in Montezuma County and Denver. Line would serve towns of Montrose,

Pipeline Patrol

Gunnison, Salida, Fairplay and South Platte, Colo. Estimated cost: $30,000,000. Company also plans 254 miles of laterals to service Colorado cities not now receiving natural gas.

328-mile line, proposed, to run from a point in La Plata County in southwestern Colorado over the Continental Divide along the eastern slope to serve Pueblo, Colorado Springs, and Denver. Estimated cost: $21,600,000.

• **Fort Worth Basin Gas Co.**—Planned, Novice, through Brown and Comanche counties, Texas.

• **Home Gas Co.**—Work under way on 24 miles of 12-in. from Halsey Valley to Westover, N. Y.

Work under way on 25 miles of 12-in. from Port Dickinson to Deposit, N. Y.

• **Hope Natural Gas Co.**—Proposing to build a 22½-mile extension of existing line from Boone County, West Virginia, to Logan-Mingo County line, West Virginia. Estimated cost: $930,000.

• **Houston Texas Gas & Oil Co.**—Company proposes to build three natural gas lines. One line would run from lower Rio Grande Valley to Chicago. The other line would go from southern Louisiana to New York City. Third line would run from Louisiana to Florida., 20, 24, 30-in., pipe considered in plans. Engineering firm reported preparing an economic report on the lines at present.

• **Iroquois Gas Corp. and Tennessee Gas Transmission Co.**—Companies planning joint storage project to be known as Colden storage field in New York. The following delivery and gathering lines are planned:

17 miles, 16-in. delivery line.

62 miles, 12, 8, 6, and 4-in. gathering lines.

• **Iroquois Gas Corp.**—25 miles of 20-in. line, approved by FPC, from Iroquois' Porterville station near Elma, N. Y., to Tonawanda, N. Y. Est. cost: $1,540,000.

• **Kansas-Nebraska Natural Gas Co., Inc.** Proposes to construct 206 miles of 6-12-in. pipeline to add to present system in central and northeastern Nebraska.

• **Manufacturers Gas Light & Heat Co.**—40 miles, proposed, Allegheny, Washington and Beaver counties, Pennsylvania.

213 miles, 3 to 26-in., proposed, various points on system in Pennsylvania, West Virginia, and Ohio.

72 miles, 16-20-in., Doddridge, Wetzel and Marshall counties, West Virginia. Fulghum Contracting Co. doing work.

• **Michigan Consolidated Gas Co.**—25 miles, 12-in., proposed, from near Sparta to Muskegon, Mich.

• **Michigan Wisconsin Pipe Line Co.**—251 miles, proposed, 24, 18, 12, 6, and 4-in. loops. Majority will be in Wisconsin.

• **Missouri Central Gas Co.**—25 miles, 6-in., proposed, Moberly to Macon, Mo.

• **Missouri Public Service Co.**—136 miles, 8-10-in., proposed, New Franklin to Trenton, Mo.

24 miles, 10-in., Johnson County to Clinton, Mo. FPC approved. Est. cost: $600,000.

• **Montana-Dakota Utilities Co.**—Proposes to build 56 miles of 2, 4, and 6-in. line from its 12-in. Cabin Creek-Bismarck line near Gladstone, N. D., to the towns of Lefor, Regent, New England, and Mott, N. D.

• Proposed 34½ miles of 12¾-in. line to run from Baker-Glendive field in Montana to Rapid City, S. D., and 14 miles of 12¾-in. to replace various lines in Park County, Wyoming, and Carbon County, Montana.

Natural Gas Pipe Line Co. of America.—Company has proposed a 280-mile line from Wise County, Texas to Panhandle field in Texas where it would connect with the Peoples Gas & Light Co. line to Chicago.

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Pipeline Patrol

• **Natural Gas Producer, Inc.**—100 miles, 12-in., planned, Yenter pool to Denver, Colo.

• **New River Gas Co.**—50 miles, planned, Summers to Monroe counties, West Virgina, to Narrows and Dublin, W. Va.

• **North Dakota Gas Transmission Co.**—470-mile line from Tioga plant of Signal Oil & Gas Co., and Beaver Lodge field to Fargo and Grand Forks, N. D. Line will have 78 miles of 12-in., 215 miles of 10-in., 70 miles of 8-in., and 107 miles of 6-in. Estimated cost: $10,800,000.

• **Northern Indiana Fuel & Light Co.**—35 miles, 8-in., planned, Edgerton to Auburn, Ind.

Northern Natural Gas Co.—Company has just recently finished a large summer expansion. Still planned are:

170 miles of 20-24-in. line in Minnesota and Wisconsin running from Duluth to Superior.

400 miles of 24-in. line from the Canadian border to tie in with its system at St. Paul-Minneapolis.

500 miles of 24 or 30-in. planned across North Dakota from Tioga past Minot to Fargo and from there eastward to the Twin Cities.

• **Northwest Alabama Gas District.**—40 miles, 9-in., proposed, Southern Natural's line through Winfield to Haleyville, Ala.

Pacific Gas & Electric Co.—200 miles, 34-in,. planned, paralleling Topock-Milpitas lines. 93 miles completed. 107 miles contracted to Engineers Limited Pipe Line Co. L. E. Robertson is in charge of the spread handling work from Newberry to Danby and from Los Muertos Creek to Gilroy, Calif. Completion November 1954.

15 miles, 20-in., planned for completion in 1955 from Helm Tap to Helm Junction, Calif. Alex Robertson Co.

15 miles, 12-in., planned for completion in 1955. From Herndon to Madera, Calif. Company forces.

• **Pacific Northwest Pipeline Corp.**—1,466 miles, proposed, Ignacio, Colo., to Bellingham, Wash. Approved by FPC.

380 miles, proposed, laterals and spurs off main line to Pocatello, Idaho, to Yakima, Wash.

• **Pine Tree Natural Gas Co.**—204 miles of undetermined size pipe to run from the Boston area to Bangor, Me.

• **Shenandoah Gas Co.**—40 miles, 3-4-8-in., proposed, Middleton, Va., to Martinsburg, W. Va. Est. cost: $1,470,000. FPC approved.

• **South Georgia Natural Gas Co.**—368 miles, 2-12-in., planned, Phoenix, Alta., to Tallahassee, Fla. (a) 12-in., Phoenix, Ala., to Albany, Ga., (b) 10-in., Albany, Ga., to Moultrie, Ga., (c) 8-in., Moultrie, Ga., to Tallahassee. Est. cost: $9,000,000. FPC approved.

• **Southwest Alabama Gas District.**—150 miles, 10 and 8-in., planned, Phoenix City to Dothan, Ala. Engineering Const. Co.

Tennessee Gas Transmission Co.—243 miles 24-in., planned, Coudersport, Pa., eastward across Pennsylvania, New Jersey, and New York to point near Greenwich, Conn.

• **Texas Eastern Transmission Corp.**—Proposed, 382-mile, 24-in. line from Kosciusko, Miss. to Beaumont, to connect with the existing 30-in. line there to Connellsville and replace the "Little Inch" in moving natural gas.

• Company proposes to build 58 miles of 20 and 16-in. pipeline from Joaquin to Longview, Tex. Cost: $3,269,000. FPC approved.

• **Transcontinental Gas Pipe Line Corp.**—421 miles, 30-36-in., looping along Texas-New York line.

• 19 miles of 12.75-in. pipe starting at West White Lake field in Vermilion Parish, Louisiana, and connecting with applicant's transmission line in same parish. Estimated cost: $1,042,310. FPC approval received.

• 57 miles of 36 and 30-in. paralleling sections of its existing system in Louisiana, Mississippi, and Alabama. Approved by FPC. Est. cost: $6,533,000.

• 25 miles of 12-in. in Cameron and Calcasieu parishes, Louisiana, to additional gas reserves. Est. cost: $1,000,000.

• **Trunkline Gas Co.**—Proposes to cross the Mississippi River with two 24-in. lines near Greenville, Miss. Est. cost: $2,960,000.

• **Utah Natural Gas Co.**—Planning 40 miles from Orem to Salt Lake City, 16-in. pipe at later date. Contract not let yet.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Foreign Crude-Oil Pipelines

• **Atlas-Dresser.**—Included in this company's agreement with the Argentine Government are plans to built a 400-mile, 16-in. crude line from Plaza Huincul area to Bahia Blanca.

Bombay Port Trust.—50 miles, 8 to 24-in., contracted, Bombay, India, to serve Standard Vacuum Oil Co., and Burmah Shell refineries. Merritt, Chapman & Scott Corp., contractors. (Crude and Products). Collins Const. Co. has subbed 84,000 ft. of Subaqueous work. Shutdown for Monsoon season during summer. Work resumed September 15.

Interprovincial Pipe Line Co. and Lakehead Pipe Line Co.—Contracts have been awarded for 604 miles of looping; 454 miles will be in Canada, the remaining 150 miles will be in the United States.

201 miles of 24-in. between Regina and Gretna, Man., have been awarded to Anderson International Contractors, Ltd., of Edmonton, Alta.

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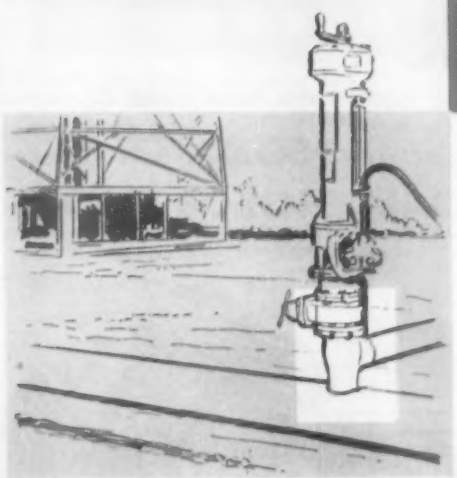

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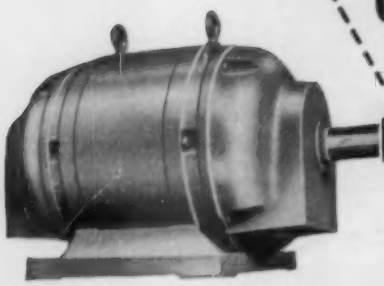

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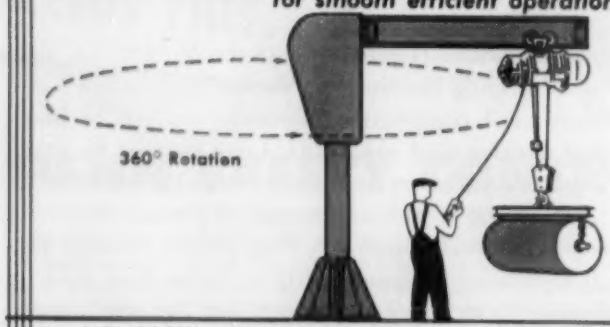

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Pipeline Patrol

Mannix, Ltd., of Calgary, Alta., will lay 129 miles of 24-in. line between Edmonton and the Alberta-Saskatchewan boundary.

Fulton-Bannister, Ltd., has contract for 125 miles of 24-in. line to connect the lines being built by Anderson and Mannix.

R. H. Fulton & Co., of Lubbock, Tex., has the contract for 104 miles of 26-in. looping from the Canadian border southeast. Anderson Bros. Corp. has contract for 50 miles of 26-in.

• **Petroleos Mexicanos.**—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

72 miles, 12-in., proposed, Poza Rica to Atzacapotzalco, Mexico.

South Saskatchewan Pipe Lines, Ltd.—Fulton-Banister, Ltd. has contract to construct 150 miles of 16-in. crude line from Fosterton field in Saskatchewan to a connection with Interprovincial Pipe Line Co.'s system at Regina. Line will have a capacity of 20,000-bbl. per day, will cost $10,000,000 and is expected to be finished in November.

Texas Petroleum Co.—Contract has been let to Foster Wheeler Corp. and Panama-Williams for a 119-mile 12-in. crude line to move oil from Velasquez field in Colombia to a connection with the main Andian National system at Galan. Est. cost: $6,000,000.

• **Yacimientos Petroliferos Fiscales Bolivianos.**—170 miles, 4-in., planned, Bermejo to Tupiza, Bolivia.

Yacimientos Petroliferos Fiscales Bolivianos.—Bolivian Government oil organization has awarded contract to Williams Brothers, Sudamericana, Ltd., to construct a 6-in. crude line from Camiri field to Yacuiba on the Argentine border. The project will cost approximately $2,500,000.

Foreign Products Pipelines

Anglo-Iranian Oil Co., Ltd.—18½ miles 16-in., under way, Little Aden to Aden. Bechtel Corp. Completion date December 1954.

18½ miles, 6-in., under way, Little Aden to Aden,. Bechtel Corp. Completion date December 1954.

15 miles, 12-in., under way, Kwinana to Fremantle, M. W. Kellogg Co. Completion date February 1955.

17 miles, 6-in., Kwinana to Fremantle. M. W. Kellogg Co. Completion date February 1955.

"You go 3,000 miles until you come to a palm tree—turn left for 200 miles and there it is—you can't miss it."

Pipeline Patrol

Australasian Petroleum Refinery, Ltd.—Company plans two lines from the new Kwinana refinery in western Australia to the port of Fremantle to be completed early in 1955. One line will be 15 miles of 12-in. The other line will be a 17-mile, 6-in. line.

• **Empresa Nacional del Petroleo** — 80 miles, 6⅝-in., planned, Concon to Santiago, Chile.

• **Governments of Southern Rhodesia and Portuguese East Africa.**—200 miles, considered, Beria, Portuguese Mozambique to Umtalia, Southern Rhodesia.

North Atlantic Treaty Organization (NATO).—1,920 miles, 4-10-in., to serve military bases in Western Europe (to connect with U. S. Government's St. Nazaire-Paris-Metz line). Contracted by Soc. Foster Wheeler Francaise.

Overland Pipeline Corp.—This South African firm has requested government permission to build a 350-mile line, to cost $8,450,000, from the South African coast to Rand, a plateau area in southern Transvaal where there is heavy petroleum consumption.

• **Petroleos Mexicanos.**—124 miles, 6-in., planned, Lagos to Guadalajara, Mexico.

54 miles, 6-in., planned, Lagos to Aguascalientes, Mexico.

82 miles, 8-in., planned, Salamanca to Lagos, Mexico.

• **United States Government.**—375 miles, 12-in., planned, St. Nazaire to Melun and Metz, France.

• **United States Navy Department.**—Proposed 300-500-mile line to be built in Spain to serve a proposed naval base and four large air bases which are also proposed under a defense agreement with the Spanish Government.

ment. No definite size or cost is known now.

Winnipeg & Central Gas Co.—Canadian company plans to build a $20 million butane-propane system. Company plans to get gas L.P.G. from Signal Oil & Gas Co.'s Tioga, N. D. plant and move it to Winnipeg. Size and route of the line has not been definitely established.

Foreign Natural-Gas Pipelines

Alberta Gas Trunk Line, Ltd.—This Canadian firm has let engineering contracts to two firms, Dutton, Williams Brothers, Ltd., and Mannix, Ltd. for a 300-mile, big inch gas-gathering system to collect Alberta's natural gas for transportation to Trans Canada Pipe Line Co.

Attock Oil Co.—Company plans to build 60-mile natural gas pipeline from Dhulian field to Rawalpindi in West Pakistan.

Azienda Generale Italiana Petroli — 90 miles, 12-in., under way, Cortemaggiore to Bologna, Italy, SNAM crews.

120 miles, 16-in., under way, Cremona Porto Mar to Ghera, Italy, Montubi, con-

40 miles, 12-in., under way, Ripalta-Bergamo, Italy.

• **Empresa Nacional del Petroleo** — 80 miles, 10-in., planned, Concon to Santiago, Chile.

Petroleos Mexicanos. — 205 miles, 16-in., under way, Monterrey to Torreon, Mexico.

• **Petroleos Mexicanos.**—440 miles, 20-in., planned, Brazil to Tampico to Poza Rica, Mexico.

Winnipeg & Central Gas Co.—Company has plans for a $20,000,000 propane-pipeline network. Line will extend from Alberta gas fields to Winnipeg and from Winnipeg to Tioga, N. D. Plans are still incomplete.

Sui Gas Transmission Co., Ltd.—Morrison-Knudsen Construction Co. has contract to build 350-mile, 16-in. line from Sui field to Karachi in West Pakistan. Est. cost: $25,000,000.

• **Trans-Canada Pipe Lines, Ltd., Canadian Delhi Oil Co.)**—2,247 miles, 14 to 30-in., proposed, Alberta to Toronto to Montreal.

747 miles, 8 to 24-in., gathering system in Alberta.

Private Interests.—Proposes to build gas line from Gubik gas field near Navy Petroleum Reserve No. 4 in Alaska to Fairbanks. Line would be 450-mile, 8-in. line and Arctic Contractor, Inc., who handled engineering requirements and preliminary design estimated the line would cost $20,000,000, although later figures have been much higher than this.

"Why, Mr. Blottz, you're back from the field —did you get a wel . . . Oh!"

You don't have to stop traffic . . .

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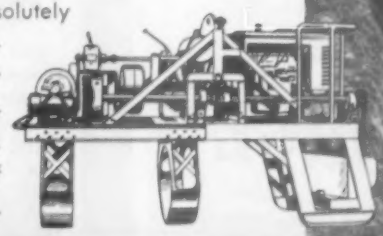

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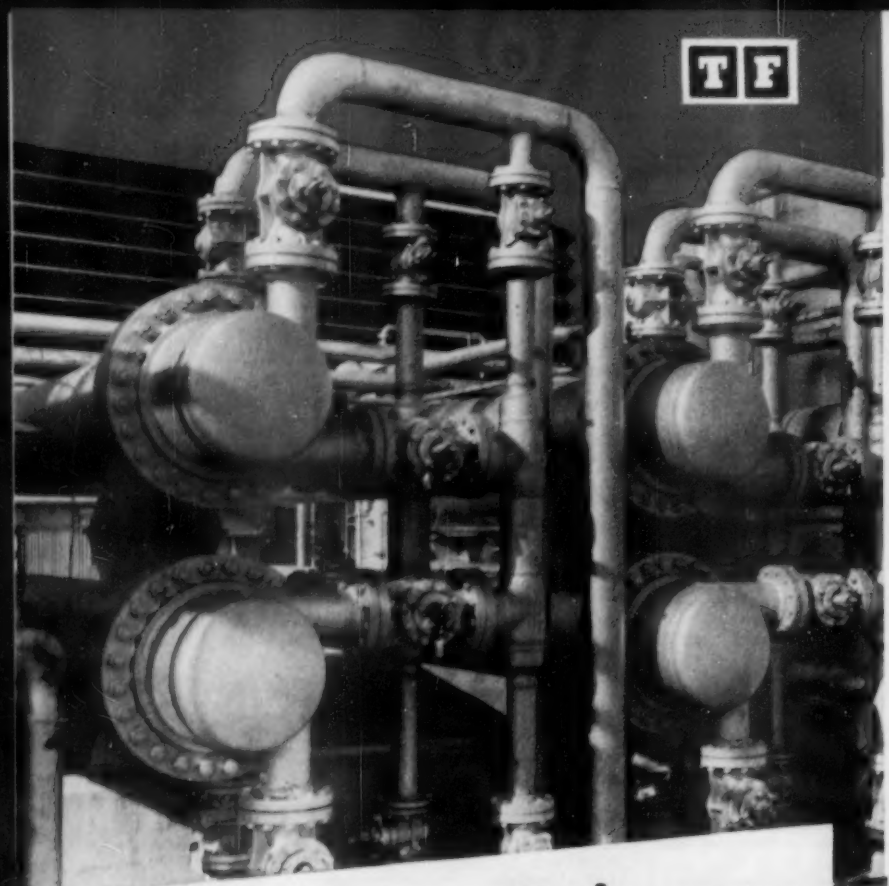

Taylor Forge all the way

Throughout the power and process industries you will see hundreds of model installations like this where someone who wanted to be sure has specified Taylor Forge all the way through...WeldELLS,® flanges, welding necks, nozzles.

Whatever your needs—simple or complex—it will pay you to *use* all the way through, the products that have *led* all the way through.

See your Taylor Forge Distributor for up-to-the-minute facts.

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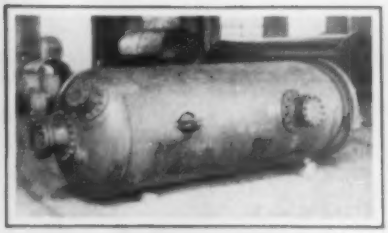


A New Development that's 37 Years Old

When you cut a hole in the shell of a pressure vessel you of course weaken it. But, how much?...or, to put it another way, how much reinforcement is necessary to make the shell surrounding an opening as strong as any other part of the shell?

In the old days of low pressure and over-sizing that hadn't been much of a problem. But when pressures began to climb fast (about 1915) it became a tough one.

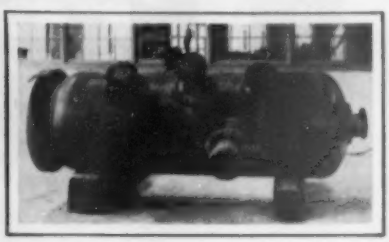
Taylor Forge had already begun to relish problems like this: had pioneered the forged steel flange; was playing a major part in the development of flange and piping standards. So it isn't at all surprising that Taylor Forge again came forward with the solution — the first seamless forged steel pressure vessel nozzles.

The research and testing that Taylor Forge put into designed pressure vessel outlets dates back to the riveted, sweep nozzles that are still giving safe, satisfactory service. But as riveting gave ground to welding, still more critical analyses were made to determine the exact requirements of nozzles designed for welding.

These many years of tests and studies were fully summed up in a paper entitled "Effects of Openings in Pressure Vessels" which was presented by the late J. Hall Taylor and Professor E. O. Waters at the June 1933 meeting of the ASME. It is still authoritative in this field.

Yes, a new idea that is 37 years old! So thoroughgoing was its first development—so critical the steps taken to maintain its leadership—that today Taylor Forge Seamless Nozzles and Welding Necks are the standards of the entire pressure vessel and piping industry.

An episode in the story of Taylor Forge leadership in designed piping



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The cards shown here are supplied for your convenience. Just ✓ ✓ ✓ check the circle with the number of the item in which you are interested, tear off the card, and drop it in the mail.

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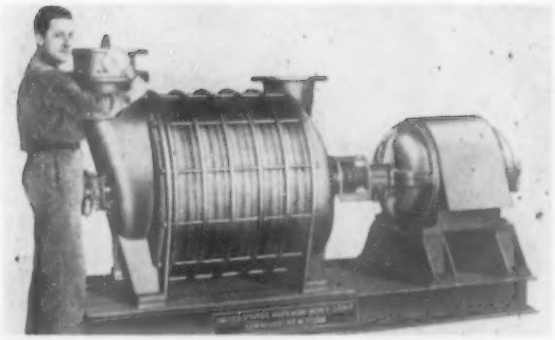
. . . What's New in Equipment?

Use the handy Time-Saver Cards ✓✓✓ to obtain additional information on these items

by Dan B. Miller



Centrifugal Blower Is Factory Assembled

The new multistage, standard-production, centrifugal blower with extreme adaptability is capable of delivering air volumes between 1,500 and 5,000 cu. ft. per minute with pressures ranging from 1 to 9-lb. gage, or vacuum from 2 to 12 in. of Hg.

Using a combination of two interchangeable impellers, the Series 385 blower can be factory-assembled to meet the individual needs of customers, cutting delivery time and cost considerably. The units are self-adapting to any variation in air-volume requirements from minimum to maximum capacity.

Units can also be equipped with impellers that impart a nonoverloading characteristic. There are no internal wearing parts and as a result, efficiency does not diminish with age. Rotor and housing are designed to permit free air flow, and each impeller is statically balanced. The rotating element is dynamically balanced to prevent vibration, resulting in a continuous 24-hours-a-day operation without adjustment. *U. S. Hoffman Machinery Corp.*

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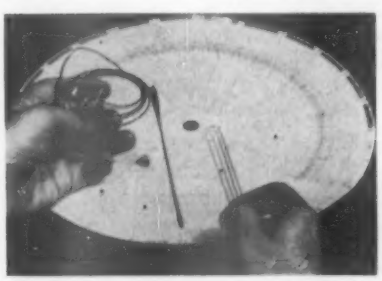


New Recording Pen Speeds Data Interpretation

A new instrument recording pen is saving operating dollars daily by speeding data interpretation and relieving skilled personnel of monotonous duties.

This featherweight, stainless-steel, capillary pen is fed from a clear, hermetically sealed, plastic ink sac containing over a year's supply. Capillary action maintains continuous flow to a precision ground point which traces a sharp, opaque, quick-drying record.

Poisoning of intersecting records is practically eliminated, thus perfecting chart legibility. As many as four pens trace on parallel time arcs only 42 thousandths of an inch apart, which simplifies record interpretation and analysis.

The sealed inking system prevents sludge and oxide formation. It is contamination-proof, noncorrosive, nonevaporating, and delivers an uninterrupted flow of fresh ink in brilliant color. Pens have run on equivalent 15-year accelerated tests at ambient temperatures from 20° to 140° F. without breakdown or appreciable wear. *Bailey Meter Co.*

Check No. 2 On The Time-Saver Card

●

New Valve Diaphragms For High Temperature Service

Higher temperature service for valves is made possible with two new types of Teflon diaphragms. Bearing the designations R-1 and R-2, these new diaphragms cover the range from —40° F. to +375° F.

The R-1 diaphragms are of one-piece solid construction and can be used in the higher temperature range. They are built with a larger, more rugged floating tube nut to permit use in vacuum service. A special compressor adapts

the standard Grinnell-Saunders diaphragm valve for the use of R-1 Teflon diaphragms which will be produced in 1 through 4-in. sizes.

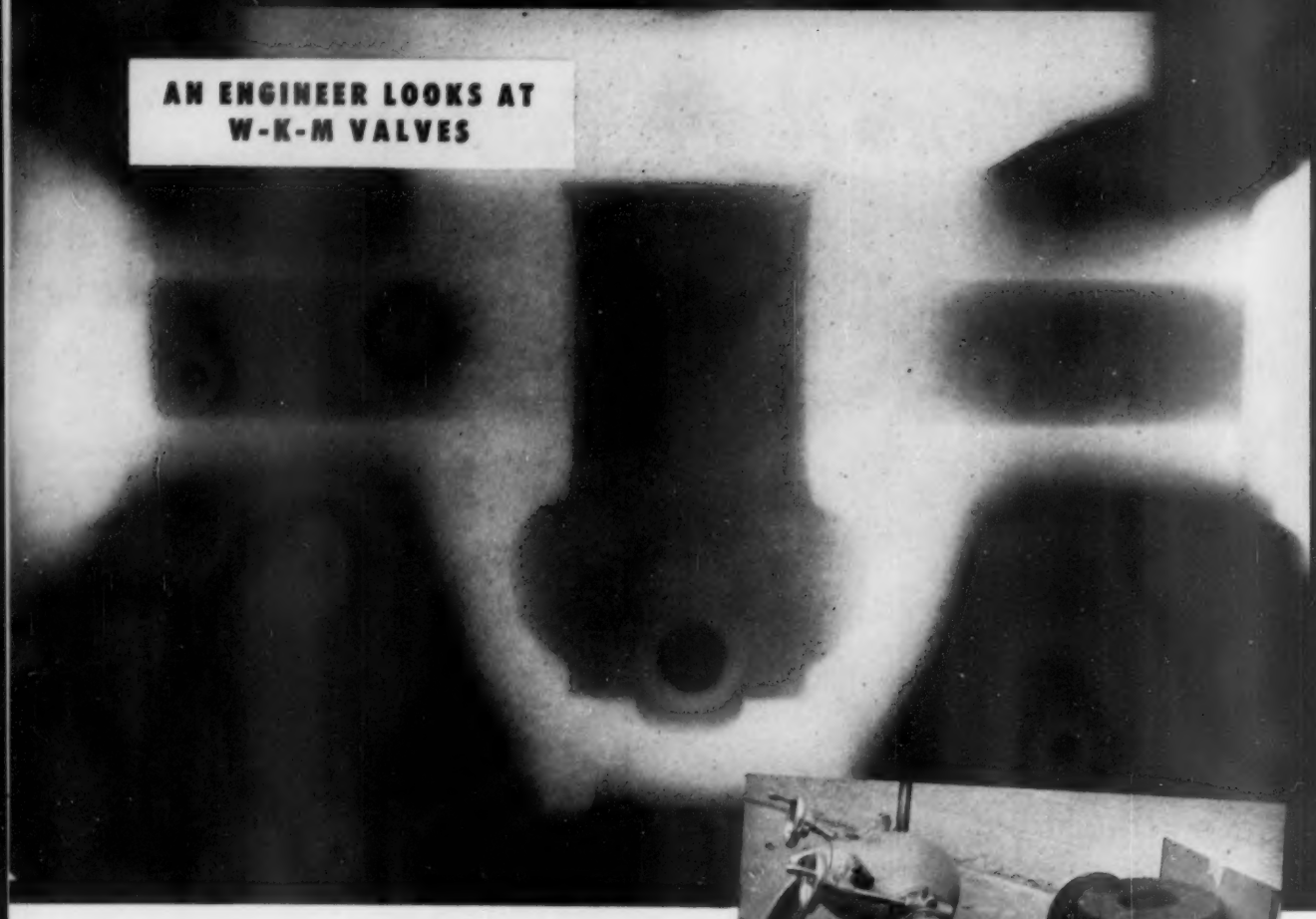
Where temperatures do not exceed 225° F. and vacuums do not exceed 12 in. of Hg, the R-2 diaphragms of two-layer construction (consisting of a thinner Teflon diaphragm with a backing cushion) are available in all sizes from ½ through 6 in. The R-2 combination is interchangeable with similar Kel-F combinations in valves which have been modified for their use.

The illustration shows the available forms of Teflon diaphragms for Grinnell-Saunders diaphragm valves. *Grinnell Co., Inc.*

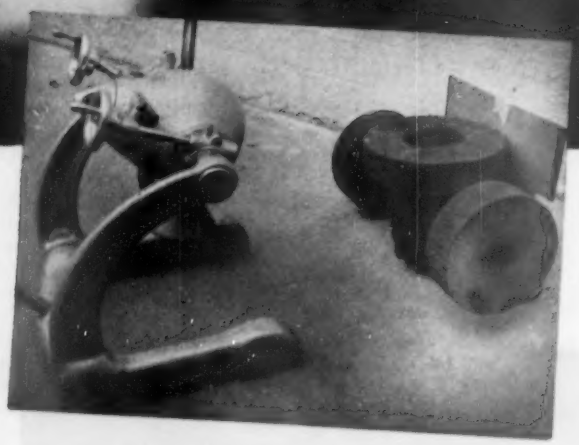
Check No. 3 On The Time-Saver Card

●

AN ENGINEER LOOKS AT W-K-M VALVES



On Gamma Ray Inspection



Careful gamma-ray inspection by an expert will reveal the following defects in light or heavy-section steel: gas and blowholes, sand spots and inclusions, internal shrinkage, hot tears, cracks, unfused chaplets, internal chills.

While the radiographic films mean little to the uninitiated, one familiar with them can spot defects to within 2% or less of the wall thickness. For example, if the total wall thickness should measure 2", it is possible to locate a blowhole or inclusion only .04" or less in diameter.

W-K-M uses gamma-ray inspection on the W-K-M 10,000—15,000 p.s.i. test valves. They are inspected according to the procedure outlined in the ASTM Spec. E 71-47T. When you specify valves for any high pressure service, be sure to remember that W-K-M high pressure valves are the soundest, safest buy in the field.

Top: W-K-M 2", 15,000 p.s.i. Steel Valve. Notice how lettering on the body and foundry mark (right) show up. The rectangle below the top hole is a penetrameter, a steel leaf (.05" thick) taped to the body to show the penetration of the gamma rays.
Bottom: The gamma ray "camera" contains 5000 millicuries of Cobalt 60, capable of penetrating 6" steel in 3.5 hours.

W-K-M Valves

W-K-M MANUFACTURING COMPANY, INC.
A SUBSIDIARY OF A.C.F. INDUSTRIES INCORPORATED
P. O. Box 2117, Houston 1, Texas Los Angeles, California
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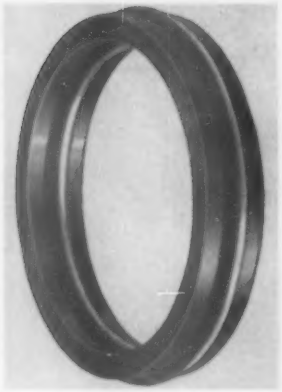


Seal Eliminates Spiral And Extrusion Failure

A new seal design for hydraulic and pneumatic applications fits into a standard groove having the recommended width to accommodate an O-ring and two back-up rings. Sealing is effected by interference at low pressures, but at high pressures a lip-type seal develops as a result of pressure distortion of the seal.

The Conneal seal eliminates spiral failures and minimizes seal wear and extrusion. It is recommended primarily for difficult high-pressure applications. *Sill-Craft Rubber Corp.*

Check No. 4 On The Time-Saver Card

●

Dewatering Pump Designed With Large Capacity

A pump to remove water from trenches and excavations is a necessity for all types of contractors. The pneumatic sump pump is preferred for these services because it can be dropped in the water, eliminating priming; it can be operated by any 105 or 125 cu. ft. per minute compressor; it is small and lightweight, easy to transport to the job, and requires small space for storage when not in use. This sump pump is designed with exceptionally large capacity, so that dewatering can be quickly accomplished. *Schramm, Inc.*

Check No. 5 On The Time-Saver Card

●

Truck-Mounted Ditcher Uses Hydra-Crowd

To provide for extreme mobility over the road and sure-footedness on bad terrain, Model 711 ditcher is mounted on a four-wheel drive Dodge Power Wagon. This vehicle offers a 45-m.p.h. road speed, dependable power, and a fully enclosed operator's cab.

Model 711 may be equipped with either of two digging booms. One has a 5-ft. digging depth and the other 3 ft. 6 in. Either boom is adaptable to digging 8½, 12, 15, or 18 in. in width Change from one digging width to another involves removal of one set of teeth and cutter bars and substitution of a set of different width. The bucket-line chain and sprockets remain unchanged.

The hydraulic-drive mechanism, Hydra-crowd, is also employed in Model 711. This shock-free power transmission utilizes a hydraulic pump and is motor-powered by the machine's engine. A single valve control regulates the machine's forward crowding speed while digging. The operator has an infinite range of forward speeds from 0 to 13 ft. per minute. This infinite range, coupled with three bucket-line speeds, lets the operator gage a combination of bucket-line speed and forward speed to suit any digging conditions. The operator may handle all of the machine controls while seated in the cab or from a standing position on the ground.

Operating, the over-all height is 6 ft. 8 in. and the boom may be carried for short distances, in a position which does not exceed this height. A reversible spoil conveyor can discharge to either side and an auxiliary conveyor can be supplied to carry the discharge back toward the rear of the machine for easier backfilling. *Barber-Greene Co.*

Check No. 6 On The Time-Saver Card

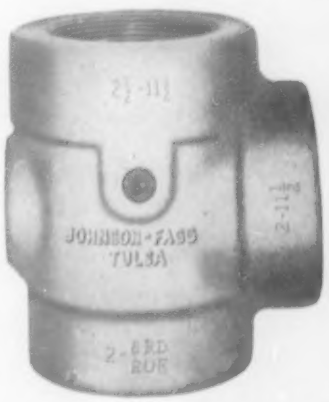
●

Pumping Tees Afford Extra Safety And Convenience

A series of new pumping tees affords additional safety and convenience. One innovation of the pumping-tee design is a pipe-plug outlet placed so that a pressure gage or chemical line may be attached to the tee without extra fittings.

A specially designed tee for 2-in. tubing is also being offered. This tee is provided with a 2½-in. top outlet which accommodates a 2½-in. stuffing box. This design permits the increase of cross-section of material in the male end of the stuffing box, affording greater strength and safety.

The pumping-tee body is made of extra-heavy high-strength malleable iron. Special attention is given to proper thread form, and all threads are



made to A.P.I. specifications. *Johnson-Fagg Engineering Co.*

Check No. 7 On The Time-Saver Card

●

more than meets the eye

Universal Oil Products Company is known, of course, for the far-reaching contributions it has made to the petroleum refining industry . . . and, hence, to the world . . . through the development and application of refining processes.

However, much is involved in this activity which is not at first apparent. Behind this continuing search for new and better methods and techniques there follows the necessary translation of the theoretical into the practical . . . painstaking pilot plant evaluation . . . experimentation . . . and the application of the most highly specialized engineering skills.

Further . . . these processes must be evaluated in terms of their adaptability to various charge stocks. The advantages, characteristics, limitations and applications must be defined. Design data, engineering specifications, construction and operation costs . . . all must be assembled. It is the sum of these factors that determines the worth and usefulness of each process.

And to make doubly certain of continued usefulness . . . Universal Service . . . year after year post-on-stream assistance is available to meet the needs of every petroleum refiner.

All of this, Universal is well equipped to do . . . has been doing for years . . . and is, perhaps, in a better position to do than any similar organization serving the petroleum refining industry.

UNIVERSAL
OIL PRODUCTS
COMPANY

UOP

30 ALGONQUIN ROAD,
DES PLAINES, ILL., U. S. A.
Laboratories: RIVERSIDE, ILLINOIS

Universal Service
Protects Your Investment

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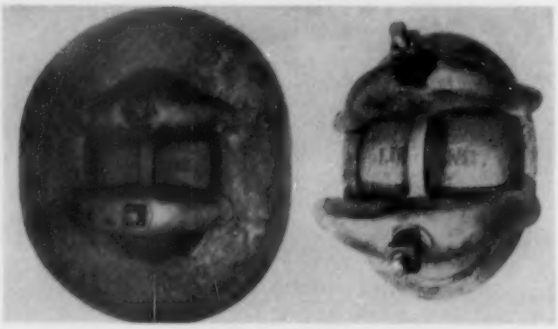

Manhole Fittings Made for High Pressure

An expanded line of manhole fittings, one type of which can be used at working pressures as high as 1,000 psi., is of elliptical design. Engineers achieved the design by capitalizing on the simple principle that when a cover fails, it tries to assume a spherical shape. The new fitting approximates this shape initially to give much greater strength than any other design, as well as reduced weight for easier installation and handling.

These covers have been approved by the A.S.M.E. boiler code committee for maximum working pressures of from 150 psi. in a new single yoke type weighing only 24 lb. up to the 1,000 psi. cover. This latter is 12 by 6 in. in size, 1 in. in thickness, and weighs 136½ lb. *Lukens Steel Co.*

Check No. 8 On The Time-Saver Card

●

Fyre-Armor Protects Against 2,500° F. Blaze

The hazards of flame and high radiant heat are conquered by Fyre-Armor, a new, lightweight, aluminized fabric. Demonstrators clad in Fyre-Armor suits entered 2,500° F. gasoline and oil blazes and emerged unscathed. They even carried a demonstrator wrapped in the material, in and out of the dense flame and smoke.

Utilizing a newly developed process, the suits are made of flame-resistant fabric fused to metallic layers which have been topped with treated aluminum foil. The lightweight suits available in 10 models allow complete freedom of movement and mobility and weight just 5 to 10 lb.

Body temperatures recorded under Fyre-Armor remain normal even in high radiant heat of 2,500° F. or more. Hoods of Fyre-Armor allow 180° visibility and allow the use of breathing equipment. Hoods, leggings, aprons, boots, and coats may be obtained separately. *Far-Ex Corp.*

Check No. 9 On The Time-Saver Card

●

Parco Provides Method of Scale Models of Plants

The end product of a new method of producing scale models results in photo-construction drawings. The new approach is a method of utilizing an erector-set type of scale-model construction by design engineers to obtain a physical presentation of a project, from inception through completion. Once engineers have a flow sheet and plot plan they no longer transfer their design to paper. The engineer simply performs his design directly through the technique to a detailed scale model. From this stage, a series of photographs with a patented process and construction plans is obtained.

Most noteworthy is the fact that by using this method, both the model and construction plans are produced in a small fraction of the time and cost normally encountered in standard procedure. For example, on a $10 million project this technique makes it possible to save 50 per cent in time and costs for furnished engineering plans and models. *Parco Co., Inc.*

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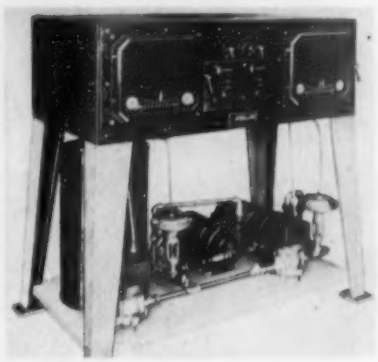

Blender Packaged For On-Stream Operation

A two-component blender has been designed to provide industry with a complete equipment package for on-stream blending. The blender is suited for such applications as caustic dilution, asphalt blending, cutting of heavy-fuel oil, and blending of butane and gasoline.

This blender automatically delivers a uniform blend directly to tank trucks, tank cars, ships or storage. The desired blend may be duplicated with accurate uniformity for any number of batches and produced as needed in much less time and at lower cost than is possible by manual methods. Lower blending costs result from the elimination of added tank storage, mechanical mixing, and stratification. *Proportioneers, Inc.*

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●

Detroit Diesel Adds Water Filter As Optional

A new engine water filter is an optional accessory on Series 51, 71, and 6-110 Detroit diesel engines. Through the use of mechanical filtration, inhibitors, and resistor plates the filter

FILL YOUR CASING AUTOMATICALLY

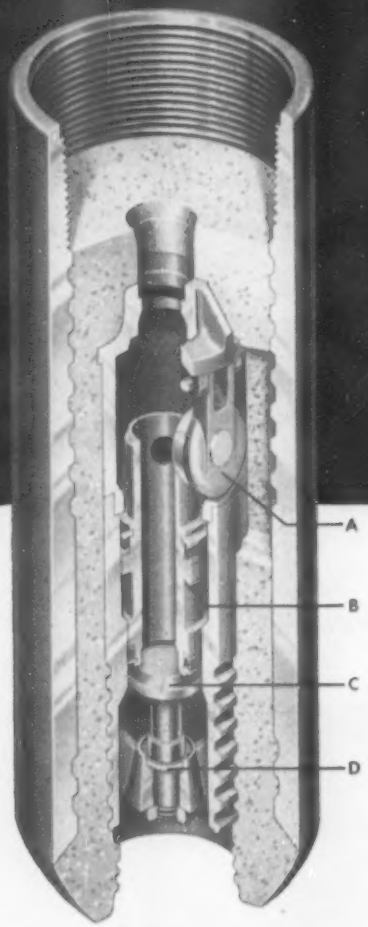
...from the bottom...while it's being run

with BAKER

- **DIFFERENTIAL FILL-UP SHOES** *and*
- **DIFFERENTIAL FILL-UP COLLARS**

Here's what DIFFERENTIAL FILL-UP Equipment does . . .

Permits the casing to *fill automatically from the bottom*, while it is being run, to within 90% of the fluid level of the annulus (using a shoe OR a collar)—or to within 81% of the fluid level of the annulus (using both a shoe AND a collar). In addition, a back-pressure valve is present to be used at the *discretion of the operator*, for "floating" or for cementing.



Baker DIFFERENTIAL FILL-UP Shoe, Product No. 1081.

A—Flapper Valve functions only at discretion of operator.
B—Sleeve Valve operates to control rate of flow and volume of "fill-up" fluid.
C—Sleeve Valve Seat.
D—Shear Ring is sheared. Flapper Valve now functions for floating or cementing.

Here's how Baker DIFFERENTIAL FILL-UP Equipment will aid you to avoid danger, increase rig efficiency, save valuable time and promote safety...

REDUCES THE DANGEROUS "RAM EFFECT" thus minimizing the hazard of breaking down a potential lost circulation zone.

SAVES COSTLY DRILLING MUD that might otherwise be lost to the formation due to the "ram effect."

MINIMIZES DAMAGE TO MUD CAKE on the wall of the hole. The majority of the fluid displaced as the casing string is lowered enters the casing instead of flowing up the annulus and causing possible damage to the mud cake.

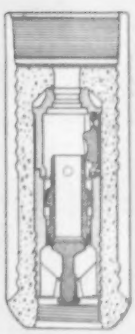
REDUCES DANGER OF STICKING CASING by reducing to a minimum the "no-motion time" formerly required to fill casing at the surface—extremely important when running casing in directional holes or sloughing formations.

SAVES ONE-HALF THE RUNNING-IN TIME plus the proven advantages of Baker Floating Equipment, including a back-pressure valve for cementing.

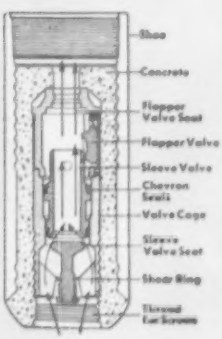
KEEPS THE RIG FLOOR CLEAN AND SAFE by eliminating the messy spill-over and splattering of mud present when casing is filled at the surface.

Ask any Baker representative or office for this new 16-page illustrated brochure . . .

BAKER OIL TOOLS, INC., HOUSTON • LOS ANGELES • NEW YORK



When running-in, the Sleeve Valve is in closed position in contact with the Sleeve Valve Seat. When the Sleeve Valve is in this position, fluid entry into the casing from below the valve is effectively blocked. The Sleeve Valve will be in the closed position whenever the height of the fluid column in the casing (the fill) EXCEEDS 90% of the height of the fluid column in the annulus.



When the height of the fluid column in the casing (the fill) is LESS than 90% of the height of the fluid column in the annulus, the Sleeve Valve moves upward away from the Seat and permits fluid entry into the casing through the bottom of the FILL-UP Shoe. During the casing run, the Sleeve Valve opens and closes according to the pressures imposed on its top and bottom areas and thus automatically regulates the degree of fill.

When it is time for cementing, pressure of approximately 1,000 psi is built up in the casing to shear the Shear Ring that holds the Sleeve Valve Seat in the supporting vanes of the Valve Cage. The Sleeve Valve can then move downward sufficiently to release the spring-loaded Flapper Valve, and thereafter the FILL-UP Shoe functions as a conventional Float Shoe.

Judge Layne

by the industries it serves

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removes impurities from the cooling system, softens the cooling water, and controls alkalinity, rust formation, and electrochemical action. The unit contains a replaceable filter element which is to be renewed at regular intervals depending upon the chemical composition of the cooling water. In the event the element becomes clogged, water bypasses the filter and no filtering action takes place until the element is replaced.

The filters are easily installed and range from 3½ to 5 in. in diameter and from 6 to 7½ in. in height. *Detroit Diesel Engine Division, General Motors Corp.*

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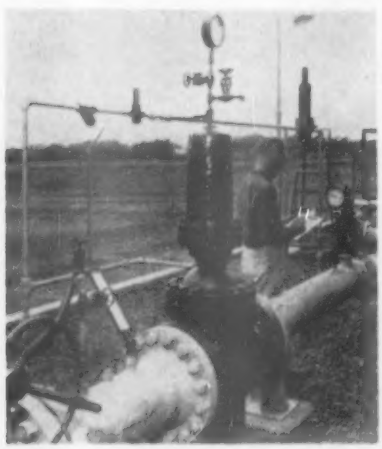
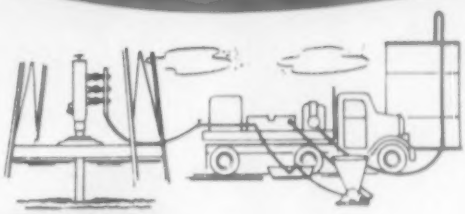


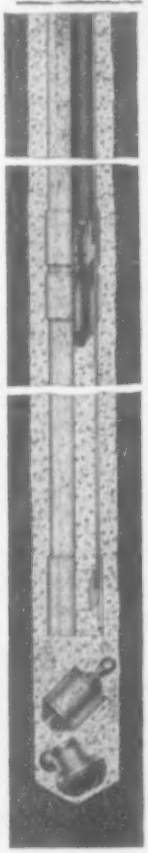
Pipeline Regulating Valve Has Wide Range

Of the venturi-ball design, this new self-actuating regulating valve for product pipeline services features steady response to flow and pressure changes, with linear throttling characteristics. Applications of the valve are for delivery terminal takeoff, pump-discharge regulation, pump-suction regulation.

Straight-through flow minimizes pressure drop through the valve when open. The valve has a broad control range with positive positioning throughout the stroke, and drop-tight shutoff. Due to

RECTOR FULBORE METHOD assures a BETTER Cementing job . . .





and Here's Why!

Simplest of all two-plug methods, the Rector Fulbore Method also has these 5 basic principles which are absolutely essential for better cementing jobs.

1. Complete and positive segregation of cement between the two tight-fitting plugs.
2. Closed circuit. Cementing head is assembled before making-up on casing string. It's never opened during operations . . . air pockets can't form in mud or cement column.
3. Full Casing Discharge. Ejection of float assembly from shoe provides unrestricted opening, reduces load on pumps, permits greater discharge volume.
4. Positive Flow-Back Control is assured when top plug latches in stall collar.
5. Wiping action on casing is provided by lips on both plugs.

It will pay you to get complete information about the Rector Fulbore Method of cementing before your next cementing job . . . also about our new Two-Plug Stage cementer for your next stage job.

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the venturi-ball design, it has low breakaway opening force, and steady stroking stem load.

The simple piston and cylinder actuator utilizes a floating piston without rings or seals. It gives free flow between valve body and cylinder, therefore requires no stuffing box and no picking and stem seals. Speed of response is adjustable, and provisions are made for manual emergency operation.

Regulating valves are made in sizes from 3 to 12 in., 600 psi. series. Materials are cast steel with high-chrome stainless-hardened trim. *Paul Valve Corp.*

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●

No Washoff Is Feature Of New Magnetic Basket

An innovation in the magnetic basket enables the operator to cut off all circulation through the basket before leaving bottom. This eliminates the jetting effect of the fluid at the end of the magnet which would tend to wash off the fish. Circulation is cut off by dropping a steel ball into the drill string and bringing up fluid pressure slightly to speed its descent. The ball seats in the tool, and mud drains off through small ports above the ball, preventing a wet pulling job. Tools are available in sizes from 4½ through 10 in. *Milwaukee Tool & Engineering Co., Inc.*

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●

Pin Of Trucker's Snatch Block Assures Safe Locking

Trucker's snatch block is manufactured for use in all fields of light or heavy hauling, construction, or rigging work. The outstanding feature is the new type of threaded bolt pin or yoke pin which offers positive and safe locking facilities.

A triple locking feature is incorporated in its operation to prevent any

possible loss through truck vibration. After the pin has bypassed these locking points it recesses into a permanent locking position for positive assurance against any loss of pin. The head of the pin consists of a four-pronged construction which offers easy handling and facilities to tighten more securely if desired.

The block can be completely dismantled by firmly tapping the top pin in order to bypass the permanent locking position. Then remove the hook assembly and rotate the movable side plate to the right approximately 60° to the unlocking point, slip this plate off and remove the sheave. All parts of this block can be ordered separately and are easily assembled by the user.

Trucker's snatch blocks are available in five sizes: light-duty 6 in., heavy-duty 6½, 8, 8½, and 10½ in. The working-load capacities range from 25 to 45 tons with ultimate hook capacity of 120,000 lb. *LeBus Rotary Tool Works.*

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●

Stud-Welding Gun Designed For Greater Length Range

A new and more versatile stud-welding gun will be available with cable and controls in two sizes, one for welding studs with diameters up to ½ in. and the other for any diameters from 10 gage up to 1 in. and greater.

Although control equipment for welding studs over 1 in. in diameter is not yet available, the gun will weld studs up to 1½ in. The new design accommodates a greater range of stud length without changing adaptors or other accessories. Arc length can be adjusted without disassembly. New coil design offers greater lifting power and improved efficiency. The smooth barrel design and elimination of the side cable loop simplifies accurate stud alignment and gives a high degree of precision balance. *Nelson Stud Welding Division, Gregory Industries, Inc.*

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●

Dravo Corp. Introduces New Tri-Forged Weldon Grating

Known as Tri-Forged welded grating, this new product is of all-welded, one-piece construction with rectangular openings. Tri-Forged welded grating is constructed with double triangular crossbars permanently welded to rectangular bearing bars to produce one-piece construction. The special design of double triangular crossbars was the outcome of research which proved this cross-section to be an ideal geometrical shape for pressure welding. It provides uniform pressure at all points of the V-contact during the welding operation. Thus, perfect fusion of the crossbar to bearing bars is achieved.

The forge welding of the triangular crossbar to the bearing bars is done under a constant pressure both during and after the electrical welding. By continuing the combination of pressure and fusion heat, on both sides of the lower triangle or all areas of contact, perfect fusion of the bars is achieved under a relatively low temperature. Furthermore, excess metal resulting from the weld fuses to the crossbar and gives the weld additional strength.

The tops of these double triangular crossbar form nonslip edges for greater traction and safety. Where sure footing is an absolute necessity in extremely slippery areas, bearing bars can be supplied with serrated edges. Adequately sized standard openings between bearings and crossbars provide for the passage of a maximum amount of light and ventilation. With the complete absence of acute angles, nuts, bolts, and rivet heads, the chance of clogging with dirt or grease is eliminated. *Dravo Corp.*

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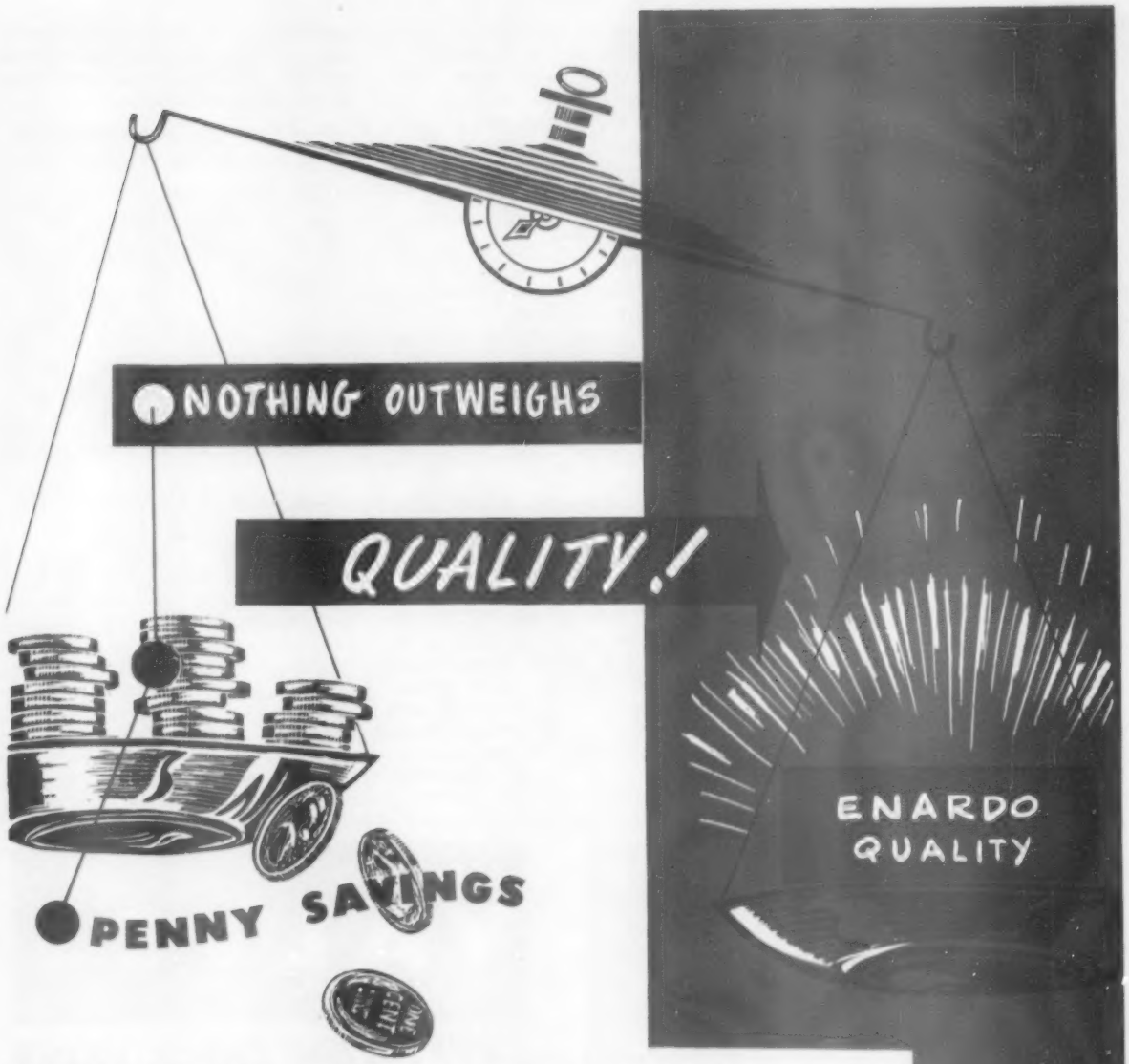

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New Oil-Field Detection Technique. The Radioactivity Anomalies Technique which is being offered, is a list of 20 comprehensive articles and commentaries dealing with and explaining how the radioactivity anomalies technique operates. Publishers' addresses are included with the titles of the articles, many of which were written by leading exploration geophysicists. *Radiac Co.*

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●

Neptune Meter Bulletin. Full details of several recently announced industrial liquid meters are given in new Bulletin 567. Included are Auto-Stop quantity-control meters, Auto-Switch meters which actuate an electrical switch when the desired quantity has been metered, Print-O-Meters which aid quality and inventory control by providing printed tickets for each delivery or batch, and meters with simple, direct-reading registers. Of particular importance to process engineers is a chart which helps in the selection of the proper size and type of meter for any given application. *Neptune Meter Co.*

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●

Flush Diaphragm Pressure Transmitter. The two-page bulletin A-713 describes the Type P3T transmitter in detail and gives data on principles of operation. It is illustrated with cutaway view and dimensional diagram. *Swartwout Co.*

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●

Thermoflex. A six-page folder presents Thermoflex, a multipurpose refractory-fiber felt for service to 2,000° F. Originally developed as a jet-engine insulation, Thermoflex is now available for many additional uses. It can, for example, serve as a filter medium for hot gases and liquids. It is recommended as a sound-control material where the problem of noise deadening is complicated by the presence of intense heat. It may be used as a refractory packing and fill. The folder presents essential data on Thermoflex including its K factor, sound-absorption qualities, chemical and thermal stability, densities, sizes, and thicknesses. *Johns-Manville.*

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●

Plug-Valve Actuators. A two-color, eight-page, illustrated bulletin fully describes a new line of plug-valve actuators. This line is available for the remote control of all types and sizes of wrench-operated plug valves from 1 up to 8 in. Illustrated with photographs of typical installations and detailed line drawings, the new bulletin gives complete engineering data as well as information on how the plug-valve actuators are used. *Pantex Manufacturing Corp.*

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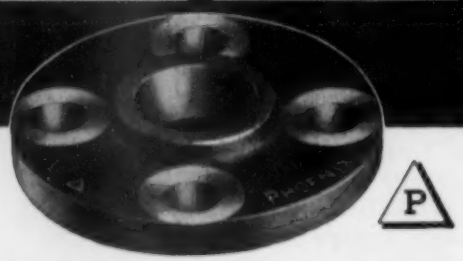
●

Armstrong Air Traps. This new four-page bulletin No. 2022 describes the methods of selecting and installing Armstrong air traps for automatic drainage of water from compressed-air intercoolers, after-coolers, receivers, separators, and drip points. Removing water from compressed-air systems prevents it from washing lubricant out of air tools and prevents moisture contamination at point of use. Also shown

PHOENIX *Drop-Forged* FLANGES MEAN . . .

MAXIMUM STRENGTH



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in the bulletin are detail drawings, physical data, and list prices of Armstrong ball float, inverted bucket, and snap-action air traps. *Armstrong Machine Works.*

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●

Celite Catalyst Carriers. A new four-page folder concisely describes the advantages of Celite-diatomite catalyst carriers such as uniformity, microporosity, low density, thermal stability, and great surface area. Essential data on each type are given in tabular form for easy reference. Variation in appearance among the types is shown in clear, close-up photographs. *Johns-Manville.*

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●

Kemp Case Histories. This new bulletin, G-10, features installations of Kemp industrial gas equipment at 17 major companies. This detailed report illustrates with on-the-spot photographs how companies in many fields save time and money, and increase production through the use of Kemp immersion heaters, dynamic dryers, and inert-gas generators. *C. M. Kemp Manufacturing Co.*

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●

Porous Fluorocarbon Filter. The new brochure describes several basic types of newly developed filters, gives data on pore size, particle-size removal, and flow capacity. In addition to data on porous fluorocarbon media and filters, information is presented on the company's engineering and application services and other plastics in controlled porosity form. *Porous Plastic Filter Co.*

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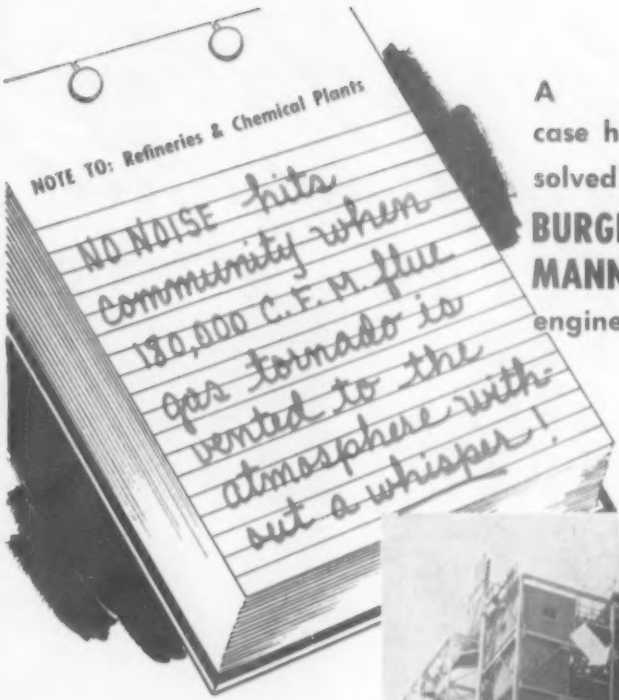
●

Willys Six-Cylinder Industrial Engines, a technical bulletin, fully describes two six-cylinder industrial engines. Power curves, engine specifications, engine illustrations, special features, and other pertinent information is included. *Industrial Engine Department, Willys Motors, Inc.*

Check No. 27 On The Time-Saver Card

●

Tournatractor Features. A 28-page folder in color describes and illustrates features of the 208-hp. rubber-tired tractor. By extensive use of photos, diagrams, and charts, Folder 54-005-T shows how the unit's range of speed cuts minutes from the work cycle, and reasons why the machine requires low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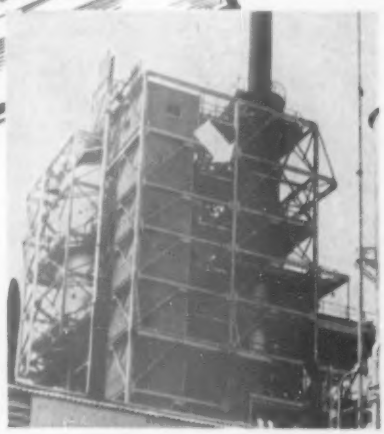
NO NOISE hits community when 130,000 C.F.M. flue gas tornado is vented to the atmosphere with-out a whisper!

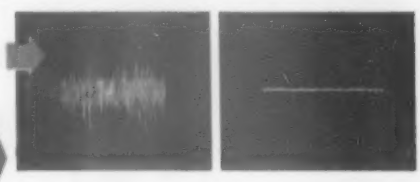
A case history solved by **BURGESS-MANNING** engineers!



The intense discharge roar of a catalyst regenerator on a fluid catalytic unit was more than the surrounding area could take without protest. For the sake of good public relations, something had to be done — so Burgess-Manning engineers were called in. The installation of a Burgess-Manning 66" Flue Gas Snubber effectively hushed the Big Noise.

Refinery plant becomes a Better Neighbor when Burgess-Manning Snubbers quiet roar.

When a Burgess-Manning Snubber is installed, the high velocity gas that produces annoying roar is converted to a smooth and quiet stream.



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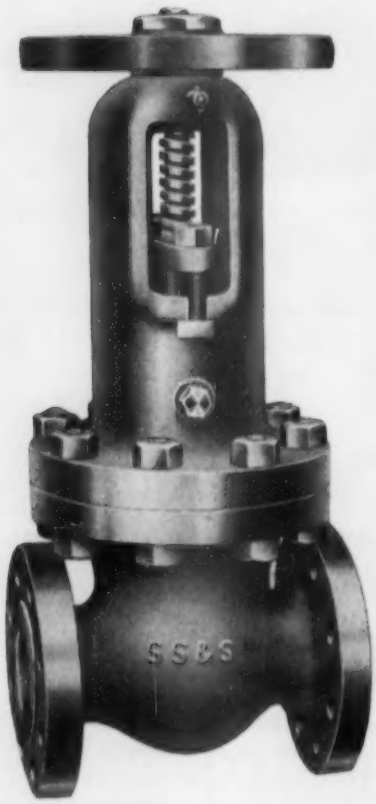

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Composite Catalog Page 3433

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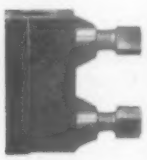

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"SURE GRIPS"

Ratigan Grips are designed to accommodate present type pumping units and have a holding capacity of approximately 53,000 lbs., yet are lightweight. Both the Ratigan No. 204 (above left) and No. 50 (right) Polished Rod Grips are made in sizes for 1⅛", 1¼" and 1½" polished rods, the No. 204 being particularly suited for pumping units which require a short and narrow gripping device.

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maintenance and few repairs. Colorful blow-ups illustrate how antifriction bearings put more horsepower to work, how the machine's heavy, all-welded steel case provides a big, rugged mounting for every operating assembly, and how electric motors at point of action give fast, positive, accurate control. *LeTourneau-Westinghouse Co.*

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Tubeseal System for Floating Roof Tanks. This literature describes, in detail, design features and operation of the new Tubeseal system. The system eliminates all vapor space in the seal area, thus preventing vapor formation and assuring a tight seal. Included are the answers to the 32 most significant questions related to floating roof operation. *Hammond Iron Works.*

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●

Extended Range Recorder. Data Sheet 10.0-18 describes the new Brown Electronik extended range recorder. Five successive suppression steps increase readibility by automatically changing the range. This extension of the range increases the effective lengths of the scale and slide wire to almost five times (11 to 51 in.) that of a single range instrument having the same range. This facilitates the measurement of any linear value variable where values change over a wide range, and precise evaluation and good resolution are important. *Minneapolis-Honeywell Regulator Co.*

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●

Consolidated Systems Engineering. Custom engineering of electronic instrumentation tailored to specific industrial needs is the subject of a colorful 16-page brochure. The attractively illustrated publication describes the role of the company's newly formed system division, established to meet demand for entire systems of automatic data processing and control equipment. Case histories of typical instrumentation systems, applications, description of service facilities and methods of planning used to solve customer problems are features highlighted in the new Bulletin CEC-1304. *Consolidated Engineering Corp.*

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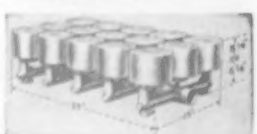
●

Le Roi L3460 and L4000 Engines. A colorful new bulletin describes and illustrates the 225 and 675 hp. Le Roi L3460 and L4000 engines. The eight-page brochure uses cutaway views and

"It sure made me want to go back to drilling"

Yes sir, when they started making hole using that new HYDRA HOOK, my hand was itching to be back on the brake. ★ When I looked at that **streamlined, compact** body, and watched how that "oil cushion" made it **so easy** to spot tool joints without banging up any threads, I **knew** there was the hook that veteran crews would go for in a big way. ★ Who makes it? Why nobody **could** except Web Wilson—the same folks who make those safe, easy operating tongs and elevators and drill pipe slips. ★ Well, yes, I kinda thought you'd want to know more about it, so just call Wm. J. Davis (Old Bill Davis to you) at Oklahoma City 85-258, or drop a line to Box 4884, Zone 9. ★ It will be a real pleasure to see you.

SAVES FUEL



The practical design of the INFERNO "Blue Flame" Low Pressure Gas Burner overcomes fuel waste, making maximum fuel savings possible. Complete and instantaneous combustion of gas afford a higher temperature in the firebox, generating more steam, faster. Write for Bulletin No. 30.

THE INFERNO CO.
Box 1138A
115 RICOU St.
SHREVEPORT, LA.

BOILER SAFETY!

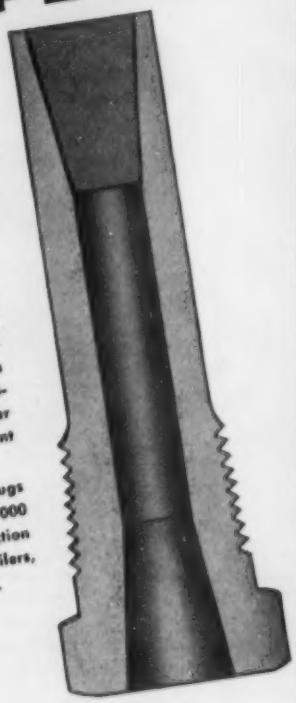
WECO

FUSIBLE PLUGS

• Weco Fusible Plugs meet revised A.S.M.E. requirements and are made in strict accordance with the requirements of the Power Boiler Code Committee. They are acceptable to all Boiler Inspection Authorities working under A.S.M.E. codes.

The ¾"x4" Fusible Plug provides additional protection. It will melt out at approximately 450 deg. F. When it melts-out it leaves approximately 9/16" of water over the crown sheet to prevent damage.

All Weco Fusible Plugs are kerosene tested to 1000 lbs. pressure. For protection and safety of your boilers, use Weco Fusible Plugs.



CONVENIENTLY PACKAGED
WECO Fusible Plugs are now packaged in corrugated cartons, clearly labeled to show size, description and quantity.

WECO FUSIBLE PLUGS

SIZE	NO.	WEIGHT
½" x 2⅛"	1093	5 oz.
½" x 2⅝"	1087	6 oz.
½" x 3½"	1081	8 oz.
⅝" x 2⅛"	1091	8 oz.
⅝" x 3"	1085	10 oz.
⅝" x 3" Lg. Thd.*	1097	10 oz.
⅝" x 4"	1079	12 oz.
⅝" x 4" Lg. Thd.*	1095	12 oz.
1" x 2-5/16"	1089	12 oz.
1" x 3"	1083	13 oz.
1" x 4"	1077	16 oz.

*1½" Thread length

It's wise to standardize with... WECO

WECO ® WELL EQUIPMENT MFG. CORP. • Division of Chiksan Company • HOUSTON 1, TEXAS

studio photos to show design features, such as the integral V-12 cylinder-block design, the counterbalanced crankshaft, and hydraulic valve lifters. Charts show the space savings of the integral V-12 design and the horsepower ratings at varying r.p.m.'s with L.P.G. fuel and gasoline or natural-gas fuel. *Le Roi Division of Westinghouse Air Brake Co.*

Check No. 32 On The Time-Saver Card

●

Well-Head Equipment. Data tables, line drawings, and ratings on tubing heads, adapters, flow beans, stuffing boxes, casing-anchor clamps, casing heads, bell nipples, tubing supports, and other accessory equipment are displayed in this 20-page catalog section. *W. C. Norris, Manufacturer.*

Check No. 33 On The Time-Saver Card

●

Pumps For the Oil Industry, a six-page foldout, utilizes a cut away picture to illustrate the features of positive-displacement pumps designed to meet the special demands of the petroleum industry. The three types in the series are: variable-output rotary piston, screw-displacement, and rotary displacement pumps. *Stothert & Pitt, Ltd.*

Check No. 34 On The Time-Saver Card

●

M-S Catalyst. This four-page booklet gives pertinent technical data on Davison's M-S catalyst, a synthetic cracking catalyst in microspheroidal form. Bulletin covers chemical, physical, and catalytic properties of the product. *Davison Chemical Co.*

Check No. 35 On The Time-Saver Card

●

Direct Heaters Series 70 lists five models including the midget, bantam, standard, large, and giant. Range of the series is from 250,000 to 4,000,000 B.t.u. per hour. Catalog 32-21 also describes temperature controllers for use on oil-field heaters. *Black, Sivalls & Bryson, Inc.*

Check No. 36 On The Time-Saver Card

●

A New Concept In Flowmeter Design. Bulletin 1-100 contains details on a new variable-area flowmeter which can be installed in a pipeline with the simplicity of an orifice plate but which has the constant pressure drop and linear signal output of the variable-area type flowmeter. *Device Engineering Co.*

Check No. 37 On The Time-Saver Card

●

ONE OF A SERIES

OF SHOP TALKS

BY

JOURNAL EDITORS

Why does the Journal carry so much international material?

There's plenty going on right here in the U.S.A.—plenty of news and technical developments to write about —but week after week we print a full quota of reports from abroad.

That's because oil is international in its scope . . . its operations . . . its impact. What happens in one place sooner or later will affect activities on the other side of the globe.

Outside the United States lie some 80 per cent of the world's petroleum reserves . . . more than half its current production . . . nearly half its refining capacity.

Most of this is operated by American techniques, much by American-trained technicians. But foreign operators often develop new engineering and operating methods which have application here.

The discovery of a new field in the Middle East . . . a new way to lay a pipeline in Europe . . . a new refinery in Australia . . . a new concession law in South America—such things are opportunities—or warnings—for oil men elsewhere.

Furthermore, many American oil men once worked abroad, or anticipate foreign assignments in the future. And many men in other countries call the United States home or got their training here.

We find that a tremendously large portion of our readers have a real and personal interest in keeping up with the industry wherever it operates. Incidentally, we also find that our foreign readers are most interested in our material on domestic developments, while our international reports are most widely read by oil men in the United States.

So both the personal interests of our readers and their need for information affecting their work are served by our carefully selected world-wide coverage every week.

That's why the Journal carries so much international material.

THE OIL AND GAS JOURNAL

EQUIPMENT MEN . . . in the News

Drew Made Representative For Oster In Mid-Continent

The appointment of John H. Drew as representative in Mid-Continent oilfield territory has been announced by Oster Manufacturing Co., Cleveland, manufacturers of pipe and bolt-threading equipment. Drew joined Oster in 1953 and has been a sales trainee for the past 2 years.

National Supply Opens Store At Drayton Valley

National Supply Co., Ltd., has opened an oil-well-supply store at Drayton Valley, Alta., Canada, to serve drillers and producers in that area. Drayton Valley is about 100 miles southwest of Edmonton, in the heart of the new Pembina field.

The store will be the fifth operated by National Supply in Alberta, the others being at Calgary, Edmonton, Redwater, and Stettler. The company also has stores at Virden, Manitoba, as well as Swift Current and Weyburn, Saskatchewan.

Stanley R. Hill has been appointed manager of the store. It is under the supervision of A. Douglas Foulds, district manager.

Wood's Expands Facilities In Dallas

T. B. Wood's Sons Co., Dallas, has just added more warehousing space and this modern office building to adequately supply and service its many customers in the Southwest. Robert G. Cahill, Wood's Southwest district manager, heads a staff of six men, two of whom are salesmen. A complete line of mechanical power-transmission equipment is carried in stock for quick delivery, including such items as mud-pump sheaves, complete V-drives, Sure-Grip sheaves, pulleys, babbitted and bronze pillow blocks, antifriction bearings, and V-belts.

BJ Service Names Riordan Vice President, Engineering

M. B. RIORDAN

Matthew B. Riordan has been named vice president in charge of engineering, research, and development of BJ Service, Inc., a wholly owned subsidiary of Byron Jackson Co., according to an announcement by E. S. Dulin, president of Byron Jackson.

Riordan has been with Byron Jackson since 1941. He has been associated with the company's oil-well equipment, research, and electronic-instrument development, including the BJ Vibrotron variable frequency temperature and pressure gage.

According to John B. Merritt, executive vice president of BJ Service, the appointment is part of the company's increased emphasis on engineering research and development. BJ Service provides cementing, acidizing, jet and bullet perforating, and radioactivity logging for oil wells, as well as marine and industrial chemical and cleaning services. Riordan will head the expanded engineering services with an enlarged staff and newly constructed facilities.

Nemco Holds Special Sales Conference At Tulsa

A group of Nelson Electric Manufacturing Co. officials look over a new feature of the company's redesigned, low-voltage switch gear at a recent special sales conference held in Tulsa. The men who attended the meeting were part of a group of Nemco officials and sales engineers from several sections of the nation. Shown are: C. E. Reed, Lyman C. Reed, Inc., New Orleans; V. C. Barringer, Jr., Washington, D. C.; Al Granger, Lynn Elliott Co., Houston; Mac Bercaw, O. M. Bercaw & R. J. Davis, Chicago; C. W. Sinclair, Sales Engineering Co., Inc., Salt Lake City; C. J. Kemp, Kemp Electric Sales Agency, St. Louis; J. B. Burtchaell, Birmingham, Ala.; O. M. Bercaw, O. M. Bercaw & R. J. Davis, Chicago; Fritz Klass, Klass Co., Minneapolis; R. S. Terbune, sales manager, Nelson Electric Manufacturing Co., Tulsa; and L. A. Beck, Peterson Co., Denver.

Continental Announces Two Key Appointments

Continental Supply Co. has announced the appointment of a vice president and a division manager in the Gulf Coast area.

HORTENSTINE

R. A. GENTRY

Raleigh Hortenstine, Jr. has been named vice president in charge of Gulf Coast operations and Richard A. Gentry is new manager of the Gulf Coast division. Hortenstine assumes the duties of the late N. A. Endicott, while

SMALL IN SIZE... BIG IN PERFORMANCE

AMERICAN IRON

UNIVERSAL FRICTION CATHEADS

MAKEUP AND BREAKOUT

For use on ANY SIZE drawworks . . . the "Universal" is small in size but BIG in performance. Easily installed on small drawworks but rugged enough for the largest drawworks.

Check these Features:

- Power enough to break any connection!
- Line pull closer to shaft bearing!
- Instantaneous engagement and release!
- No sensitive toggles to get out of adjustment!
- Rope divider mounted to safety guard — requires no welding to drawworks!
- Available with air or manual controls!

AMERICAN IRON & MACHINE WORKS CO. — OKLAHOMA CITY U.S.A.

To get the *best results* on *any drawworks*, specify American Iron Universal Friction makeup and breakout catheads!

S&R
Custom Built
PORTABLE TELESCOPING POLE MASTS—

This S & R double ladder mast is of heavy welded steel construction, and is fabricated o 10¾" pipe and 8⅝" pipe. Over-all dimensions when erected 87 feet to crown support beam and 52' when telescoped in traveling position.

Approximate weight of the complete equipment is 12,000 lbs.

The complete assembly includes the (1) poles, (2) breakdown shaft assembly, (3) attached racking platform (which positions itself when poles are raised), (4) pole adjusting screws, (5) a sheave assembly to be mounted on truck or trailer for raising the poles, (6) and a four or five 24 inch sheave crown block for ¾" line.

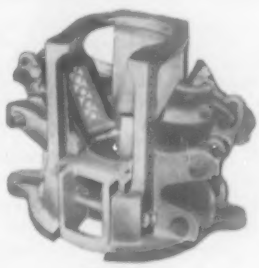
Available for truck, trailer, or skid mount.

For additional information write wire, or phone.

S & R TOOL & SUPPLY CO.
P. O. Box 1755 Houston, Texas

Export: 45 Rockefeller Plaza, New York 20, N. Y.

S&R TOOL AND SUPPLY CO. HOUSTON, TEXAS



(Pat. Pend.)

Air-Powered
TUBING SPIDER
(A Cavins Co. Product)

Two of the many reasons why you will be glad to own an

Advance TUBING SPIDER

1 **COVERS ALL SIZES:** Made in two sizes. Will handle all single strings from 1¼" tubing to 4½" OD casing, also all 2-string and 3-string parallel installations.

2 **FOR ROTARY WORK:** May be used on a rotary table with our adapter plate which fits in the master bushing.

Bulletin TS-54 tells the whole story.
We invite you to send for your copy.

Advance Oil Tool Co.
2853 Cherry Ave., Long Beach 6, Calif., Ph. 485-64

MID-CONTINENT REP.: HILLMAN-KELLEY
EXPORT REP.: ROLAND E. SMITH

Gentry takes over the division manager's position formerly held by Hortenstine.

Hortenstine joined Continental in 1934, starting in the Dallas headquarters. After moving to the field he advanced through positions as store manager, field salesman, assistant district manager, district manager, and in 1952 was appointed division manager.

Gentry started with Continental in 1936. After serving in various field positions, including salesman and store manager, he was made district credit manager in Shreveport, La., in 1944. In September 1950 he was named division credit manager, Gulf Coast divison, a position he held until his recent promotion.

Butler Promotes Executives To Key Management Posts

J. A. MORGAN

W. L. SMITH

Directors of Butler Manufacturing Co. have named John A. Morgan to the newly created post of executive vice president, and Walter L. Smith has been elected vice president, engineering and production, it has been announced by Oscar D. Nelson, president.

Morgan joined Butler 15 years ago to work in the sales and advertising departments. He served as assistant to the general manager until summer of 1949, when he took a temporary assignment as advertising and sales promotion manager. In November 1950 he was appointed assistant general manager. In December 1951, Morgan was made general manager of the company and in January 1952 was elected to the board of directors.

Smith became associated with Butler in 1934 as a product engineer in the stoker division. He progressed through various engineering responsibilities and in 1939 was named chief engineer of the company. Smith was elected to the board of directors in 1947 and was appointed chief production manager.

Fluor Adds New Research Facilities

Hosts at Fluor's open house at the new research headquarters at Whittier were left to right: J. S. Fluor, president; W. R. Hainsworth, vice president in charge of research; F. E. Fischer, secretary-treasurer; C. L. Blohm, manager of research; M. A. Ellsworth, vice president and director of sales; and J. R. Fluor, executive vice president.

Fluor Corp., Ltd., recently held an open house at the new research division in Whittier, Calif., attended by customers and employes. The building is comprised of 17,000 sq. ft. of air-conditioned office and laboratory space in additon to 2 acres devoted exclusively to pilot-plant construction and operation.

Working facilities include nine laboratories equipped for research in many engineering and processing phases, a machine shop, photographic dark room and stock rooms. At the rear of the site is the 2-acre pilot-plant area for testing large equipment used in the processing industries. Present projects in operation in this area include a pilot-compressor station, a plant for fertilizer studies, a solvent-extraction test plant, evaporative-cooling test apparatus, and a unit for checking performance of heat exchangers.

Fluor's research division is staffed with technicians experienced in the fields of chemistry, petroleum, physics, electricity, construction, mechanical engineering, and electronics, capable of conducting laboratory and pilot-plant experimental work for other divsions of Fluor or on a consulting basis for Fluor customers.

Fluor's new research plant at Whittier.

National Aluminate Names Midwest Representative

The appointment of Robert H. Mudwilder as technical representative in the Midwest area has been announced recently by the catalyst division of National Aluminate Corp. A mechanical engineering graduate of the University of Louisville, Mudwilder was previously sales engineer for General American Transportation Co. He has been with Gatx since 1949.

Lane-Wells Men Shifted

E. C. Beaumont, Lane-Wells Co. station superintendent at Opelousas, La., has been transferred to Natchez, Miss., in the same position. He is replacing J. C. Strickland, formerly in Natchez, who is moving to Opelousas as station superintendent.

Nicholson Is Sales Manager For Southern Engine & Pump

J. D. NICHOLSON

The appointment of John D. Nicholson as sales manager and the addition of Marcus Cantrell to its San Antonio sales staff has been announced by C. A. Leavens of Southern Engine & Pump Co.

Nicholson, who began as sales engineer with the firm in 1948, is well

YOU CAN RELY ON UNITED SUPPLY!
UNITED SUPPLY
COURTESY • SERVICE • DEPENDABILITY
Season's Greetings
We are deeply appreciative of the consideration you have accorded us throughout the year . . . to serve you has been our pleasure.
We extend the Season's Greetings with every good wish for the year to come . . .
UNITED SUPPLY & MFG CO
UNITED SUPPLY
AND Manufacturing COMPANY
TULSA, OKLAHOMA
Stores in: KANSAS, OKLAHOMA, TEXAS, LOUISIANA, AND NEW MEXICO
COURTESY • SERVICE • DEPENDABILITY

known to petrochemical industries through that capacity, and through his experience in refineries prior to joining Southern Engine & Pump.

Cantrell who holds degrees in mechanical and industrial engineering has recently received specialized training at the company's Houston headquarters.

Chapman Named Branch Manager for McCullough

The appointment of Robert W. Chapman as branch manager at its Wewoka, Okla., branch office has recently been announced by McCullough Tool Co.

Chapman was employed by McCullough in 1950, and has worked as operating engineer at the Oklahoma City branch until his recent promotion.

Bowen Appoints Oil Well Coring Service In Canada

Paul Bowen, president of S. R. Bowen Co. has announced the appointment of Oil Well Coring Services, Ltd. as Canadian representative, with headquarters at Edmonton, Alta., and branches at Calgary, Alta., and Virden, Manitoba.

Oil Well Coring Services sells and rents all the latest Bowen tools with particular attention to rental service. The following tools are now being stocked and serviced: Junk baskets, automatic flow controls, sealed Type I rotary jars, Type F safety joints, fishing magnets, releasing and circulating overshots, crown slip-type releasing and circulating sockets, releasing spears, bumper subs, rotary taper taps, washpipes, and a complete stock of rotary substitutes.

Irish Engineering Offers Corrosion Control Service

L. B. IRISH

J. STONECIPHER

The formation of Irish Engineering Service, Shreveport, La., a new firm offering complete corrosion control from steel mill to pipeline, has been announced by L. B. Irish, president.

The new company has a completely modern coating and wrapping plant and will work with gas and pipeline companies to apply coatings for protection against corrosion, as well as provide corrosion engineering consultation.

Irish, a corrosion and pipeline construction engineer with Arkansas Louisiana Gas Co. for the past 5 years, has engineered and supervised coating operations on more than 600 miles of 2 to 20-in. pipelines.

John Stonecipher, formerly superintendent for Perrault Equipment Co., has been appointed general superintendent in charge of coating and wrapping operations. Stonecipher has been coating and wrapping pipe for the past 20 years.

Franklin Supply Opens Store At Ratliff City

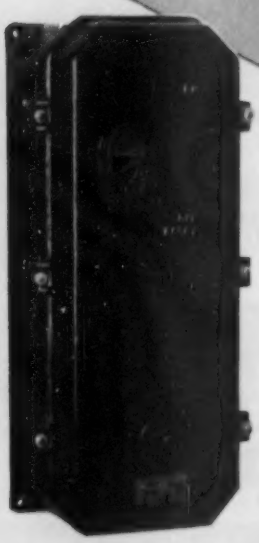
Jene Harper, president of Franklin Supply Co., has announced the opening of supply stores at Ratliff City, Okla., and Abilene, Tex.

Frank Kenefake, formerly field salesman at Odessa, Tex., has been transferred to Abilene in the same

FOR SAFE AND DEPENDABLE MOTOR CONTROL

install ..... NELSON

COMBINATION STARTERS



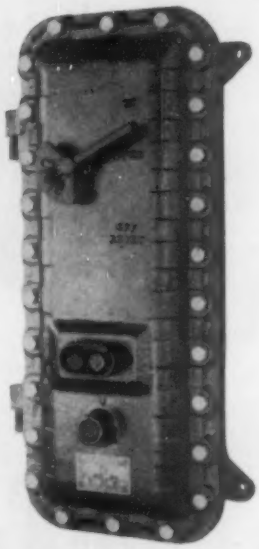
Nelson Size 2 Combination Motor Starter in water-tight and dust-tight cast iron enclosure.

The Nelson Combination Magnetic Motor Starter combines in ONE enclosure: (1) An air circuit breaker that serves as a disconnecting device and provides short circuit protection; and (2) A full voltage, across-the-line, 3-phase motor starter.

Motor overload protection is obtained with overload relays.

Starters can be furnished in explosion-proof (NEMA VII) enclosures for hazardous locations. Or, water-tight and dust-tight (NEMA IV and V) enclosures can be furnished.

Write for descriptive bulletins.



Nelson Size 2 Combination Motor Starter in heavy duty cast iron explosion-proof enclosure. Note built-in control station.

NELSON Electric MANUFACTURING CO.
TULSA, OKLAHOMA

217 N. DETROIT AVE. TELEPHONE 2-5131

capacity. Joseph Turek, formerly manager of the store at Mount Pleasant, Mich., has been appointed manager at Abilene.

Bob Spellman has been transferred as field salesman from Oklahoma City to Ratliff City and Jack Carroll has been appointed store manager. Jean McIntyre replaces Carroll as store manager at Oklahoma City. Vernon Neal has been promoted to store manager at Grayville, Ill.

Harper has also announced the opening of a New York sales office. Jack Orr has been transferred from Chicago to New York as manager, eastern division.

Oilwell Promotes Spice To Assistant District Engineer

E. N. SPICE

Promotion of Edward Norman Spice to assistant to district engineer at Wetaskiwin, Alta., Canada for U. S. Steel's Oil Well Supply Division has been announced by W. A. Weir, manager of Oilwell's Canadian area. Spice became associated with Oilwell in June 1954 at Wetaskiwin as a junior engineer, the position he held until his new appointment.

*Some of Our Customers Report Savings as High as 70%!

Oil men are highly pleased with the way we design and produce their decals and save them money. They have learned that STAN RAMSEY Decals provide a better solution to their advertising, identification and decorating problems. They will tell you that our top quality decals do not necessarily mean high prices. Oil men have faith in our proven skill to deliver economically with SELLING RESULTS always in mind.

Our staff of decal specialists can supply you with an eye-catching design . . . any size . . . any lettering . . . in any colors . . . all at costs far below that of hand painting. Our decals are made for simple, quick application, yet will last for years. Why not write us today about your decal needs? We guarantee you'll be proud of the selling job our decals will do for your good name and product!

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Designers and Manufacturers of DECALS
2727 NORTH OKLAHOMA AVE.
OKLAHOMA CITY, OKLA.

Rawson & Co. To Furnish Sales, Service, Warehousing

W. B. RAWSON

Formation of Rawson & Co., a new sales company which will offer sales, service, and warehousing facilities to manufacturers interested in the petrochemical industrial-trade area of Texas and Louisiana, has been announced by W. Brant Rawson. Company offices are located at Houston.

Rawson recently resigned from Maintenance Engineering Corp., Houston, after having been associated with the company since 1927 and having served in the position of vice president for the past 12 years. He was in charge of sales and service of mechanical equipment, such as Mason-Neilan regulators, A. O. Smith meters, and commercial orifice fittings.

Pipeline Coating Expands Mid-Continent Organization

B. A. HUGHES

A. F. VOGLER

D. E. HUGHES

Owing to the rapid growth of the oil and gas transmission industry in the Mid-Continent, Pipeline Coating & Engineering Co., Inc., has increased its Houston staff.

Ben A. Hughes has been appointed Houston office manager. He is thoroughly experienced in construction work as well as in electronics.

A. F. (Gus) Vogler, has been made sales engineer. He has had 10 years' experience in pipeline construction and operation, and was until recently sales manager of a cathodic protection firm.

D. E. Hughes, has been named district representative. He came to Plico with 5 years' experience in sales and service of oil-field and pipeline equipment.

Unsurpassed for "LP Gas"
STRATOFLEX
"235"
Flexible Hose

Developed by Stratoflex especially for conducting Butane, Propane, and ANHYDROUS AMMONIA. Seamless synthetic rubber inner tube, reinforced with fabric braid and wire braid. Abrasion resistant synthetic rubber outer cover. Order from your dealer or write for FREE catalog.

★ Hose Assemblies
★ Re-usable Hose Fittings

Dealers' Inquiries Invited

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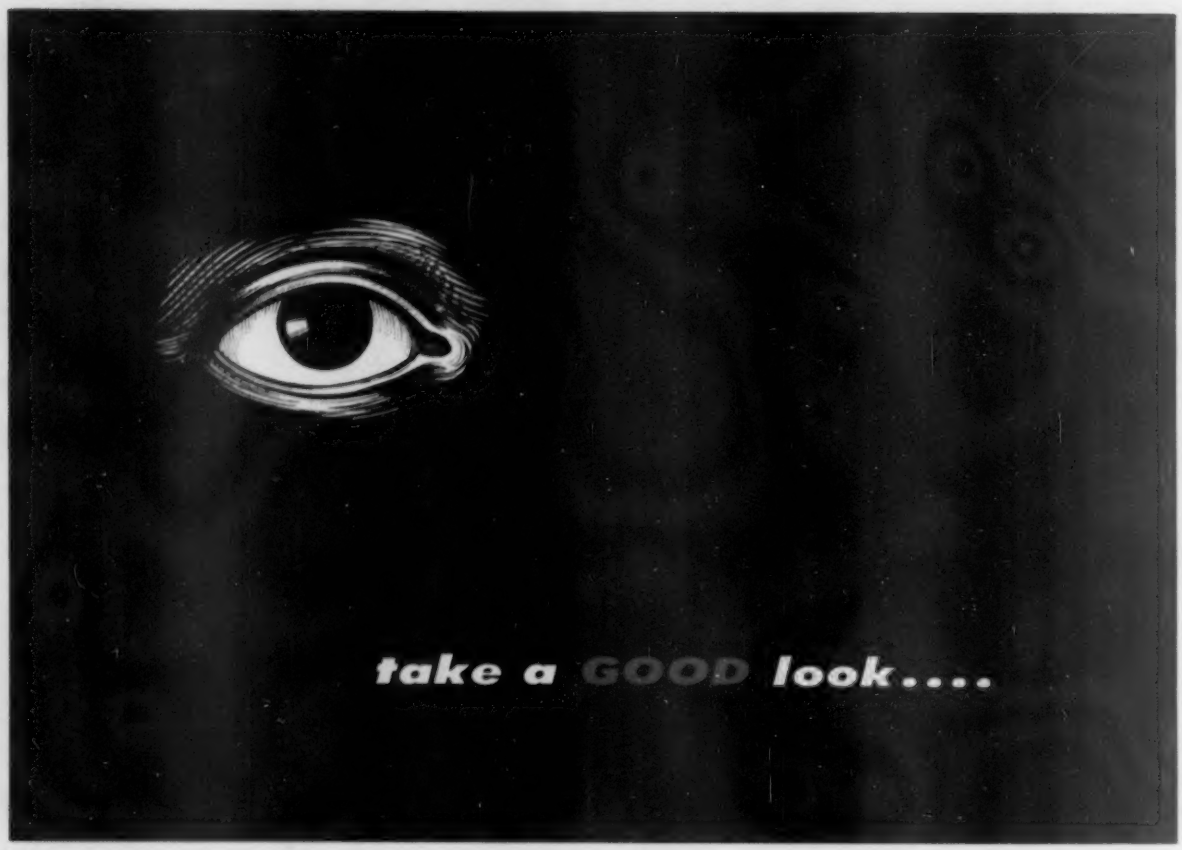
Branch Plants—Los Angeles and Toronto
Sales Offices—Atlanta, Chicago, Dayton, Houston, Kansas City, Los Angeles, Portland, New York, Toronto, Tulsa



As long as you're searching for new oil, why not take a *good* look? Use the industry's most intelligent approach toward establishing a comprehensive record of each foot drilled and cored during an exploratory test . . . Use Core Lab's double-edged derrick-side service of Well Logging (continuous analysis of drill cuttings virtually concurrent with progress of the drill bit) in combination with the finest On-Location Core Analysis available . . . Copies of Core Lab's new 12-page multi-colored Well Logging Folder (containing complete details and typical regional examples of Graphologs and corresponding Coregraphs) are immediately available. Please make request on your company letterhead and direct to address below.

CORE LABORATORIES, INC.

801 CORE STREET, DALLAS, TEXAS

CORE LAB

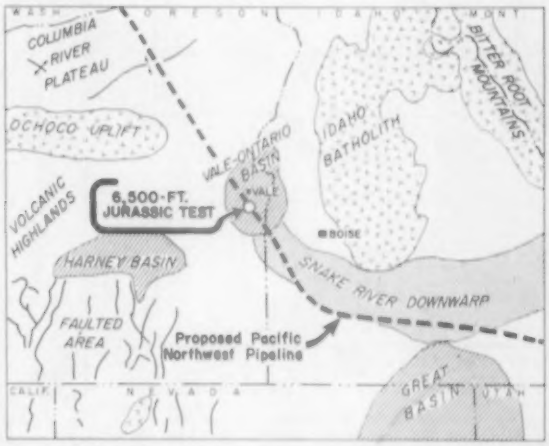
PETROLEUM RESERVOIR ENGINEERING

DALLAS, HOUSTON, CORPUS CHRISTI, MIDLAND, ABILENE, SAN ANTONIO, TYLER, TULSA, FT. WORTH, WICHITA FALLS, OKLAHOMA CITY, ARDMORE, PAMPA, ARKANSAS CITY, GREAT BEND, NEW ORLEANS, SHREVEPORT, HATTIESBURG, JACKSON, LAFAYETTE, DENVER, BAKERSFIELD, WORLAND, STERLING, BILLINGS, CASPER, EL DORADO, LUBBOCK, FARMINGTON, LOVINGTON, CALGARY, EDMONTON, REGINA, CANADA; VENEZUELA, S. A.

EXPLORATION

Wildcat Along the Oregon Trail

by John C. McCaslin



Tectonic sketch of the Idaho-Oregon border region shows location of El Paso Natural Gas Co.'s new wildcat which will test to the 6,500-ft. mark in the Jurassic. Winding heavy line indicates route of proposed Pacific Northwest pipeline.

SINCE the announcement of the Pacific Northwest pipeline, which will run from the San Juan basin to Washington State, much exploratory interest has mushroomed along its curving, mountainous trail. Immediately after plans for the line were made public, new discoveries began popping up in the San Juan, Paradox, and Green River basins. Each week has seen new locations staked in these areas.

Farther up the pipeline route near the Idaho-Oregon border El Paso Natural Gas Co. recently announced a 6,500-ft. Jurassic test in Malhuer County, Oregon, 10 miles south of the town of Vale in 5-20s-44e. Loffland Brothers Co., of Tulsa, will drill the Vale-Ontario basin wildcat which is 15 miles west of the Idaho border. The test has been designated the 1 Federal. It is on farmout from Sinclair Oil & Gas Co.

Oregon's Geologic Picture

This northwestern state is divided into two widely separated areas—the Coast Range Province with its Tertiary rocks, and the Central Oregon Province of Mesozoic and Paleozoic sediments. The lofty Cascade Range splits the two regions.

The rest of Oregon is covered with a great thickness of volcanics, which is broken only by the Klamath Mountains in the southwest and the Blue-Wallowa Mountains in the northeast. Interbedded with this thick volcanic section are Tertiary and Recent sediments of land origin. These sediments blanket any pre-Tertiary marine sediments that may be present, throwing a veil of secrecy over Oregon's petroliferous possibilities.

Two Basins

Two basins are located in this vast, complex region—the Harney and the Vale-Ontario. The Harney basin lies in the southeastern part of Oregon, while the Vale-Ontario straddles the Idaho-Oregon border in the east-central part of the state. Both basins have had previous wildcat activity, spanning a period of more than 40 years.

Harney basin . . . This depression is a structural and topographic basin. It is about 75 miles in length with its axial trend east-west. The basin is the northern extreme of the huge Basin and Range Province which covers the greater part of Idaho, Utah, and Nevada.

The basin's rocks are chiefly volcanic in nature. These volcanics are interbedded with stream and lake deposits. The basin's section ranges in age from Miocene to Recent. Composite thickness of these beds is more than 4,000 ft. About 15 wildcats have explored the area, the deepest of which was abandoned in 1949 at 6,480 ft. Some of the wells reported strong gas blows. It is generally thought that the gas was of the marsh variety, coming from late Tertiary or Quaternary sediments. Most of the wildcats drilled stopped above 2,000 ft.

Whether or not there are marine Mesozoic and Paleozoic deposits beneath the great mantle of volcanics is a question that can be answered only by the drill. These possible marine sediments are the key to the oil and gas possibilities of the eastern Oregon-western Idaho region.

Vale-Ontario basin . . . It is in this relatively small area that El Paso will drill its interesting wildcat. The east-central Oregon basin is located in the western end of the Snake River downwarp (see map). Several thousand feet of Miocene and younger deposits have been laid down here. Like the Harney basin, the sediments are of lake, stream, and continental origin. Volcanics do not make up a considerable part of the section as is the case in the Harney basin.

Quite a few deep artesian wells have been drilled in the Snake River downwarp, a large synclinal trough. A few of these wells have found gas in enough quantity to warrant domestic consumption locally. Most of these wells were drilled southwest of the town of Vale. According to reports some of the wells blew out of control.

Gas or Oil?

Conditions in eastern Oregon are not too favorable for the accumulation of oil due to the nonmarine character of the two basins. But there is a rather bright possibility of gas production, particularly in the Vale-Ontario region. The area has one point in its favor—gas has been found there. It has also been found in similar areas elsewhere in the world. More test holes are needed to unlock the mystery of the vast volcanic blanket, which may cover marine sediments.

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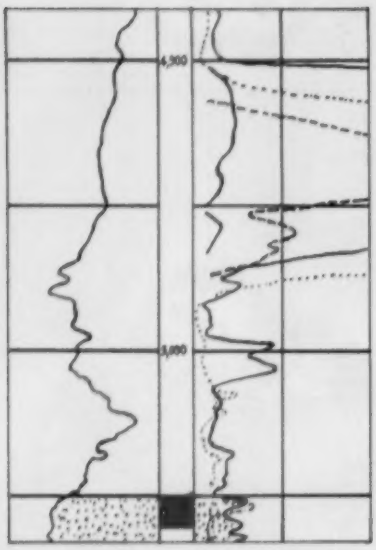

Fig. 1—Analysis of the electric log on the above dry hole indicated interval 5,050-66 ft. was oil-bearing. Well was cleaned out and completed for an initial potential of 225 bbl. of oil per day.

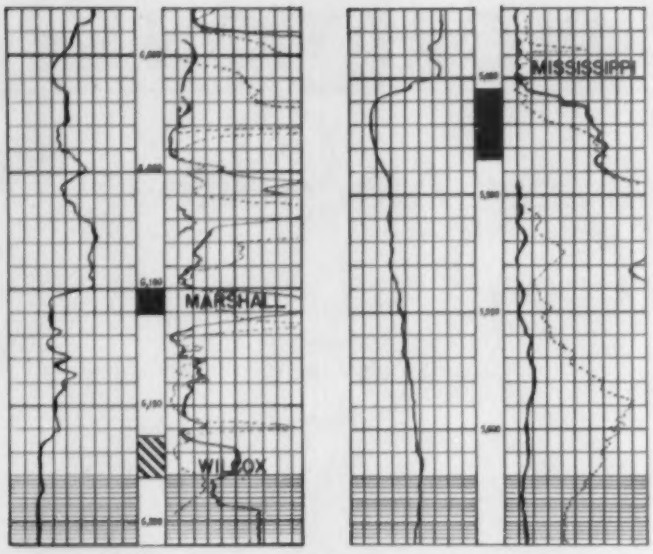

Fig. 2—This "dry hole" has estimated reserves of 200,000 bbl., but was originally plugged. Subsequent development found substantial reserves, both in the Marshall zone and in the Mississippian.

Finding Oil With Electric Logs

Part 2

The author discussed the use of electric logs as an exploration tool in the December 6 issue of the Journal on page 180. Three case histories are presented here to show the value of this new approach in finding reserves.

by Dr. Robert G. Hamilton

ELECTRIC-LOG interpretation is fast becoming an important exploration tool. The successful results are a powerful argument in justifying this new approach. In the past, many potential producers were plugged for one reason or another. Analysis of the electric logs provides an inexpensive but proven method of locating new production.

Prospects for New Oil

What are the basic ingredients of a successful search for oil by means of electric-log analyses? In general, the chances are best in areas where multiple sands and limes are productive. Also, there must be a reasonable number of logs available for analysis.

In some densely drilled areas, there have been so many logs available for study that many old holes have already been made into producers. However, this does not preclude additional discoveries from further or more detailed study. An example is eastern Oklahoma where new discoveries are being made almost every week.

Not only are some areas highly favorable for hunting oil with electric logs, but certain conditions may enhance the prospects. They may be summarized as follows:

1. Where the logs have been difficult to interpret due to abnormally low kicks or abnormally high kicks.

2. Bentonitic sands of the Gulf Coast.

3. Clay minerals and dirty sands everywhere. The Simpson section of the Mid-Continent, the Aux Vase of the Illinois basin, the Tuscaloosa of Mississippi, and the Cretaceous sands of Canada are only a few.

4. In the areas drilled before the advent of logging, a few logs recorded in recent holes have led to some interesting discoveries.

5. In formations such as the Mississippi Chattanooga, having very high porosity and sometimes containing tripolite. These permit the production of oil on extremely low resistivity values that were originally interpreted to indicate water.

6. In thin beds everywhere. They are still difficult to interpret.

7. In sand underlying thin coal, lime, or lignite beds. The logs have not been too easily interpreted in the past.

8. In areas where muds have been very salty.

9. Where mud invasion was excessive due to poor mud control.

10. In wells where there was a controversy among participants.

11. Thin formations at the bottom of the hole.

12. In areas where samples were never saved from shallow beds. Such an area is northern Oklahoma where we now have shallow production from the Sams, Crews, Regan, etc.

13. In fields where only the older, two-curve logs were recorded.

14. Thin, porous beds sandwiched between thick, resistive beds, such as

Author is with Hamilton Well Log Consultants, Tulsa. This paper was presented at the annual meeting of I.P.A.A. in Tulsa, October 26, 1954.

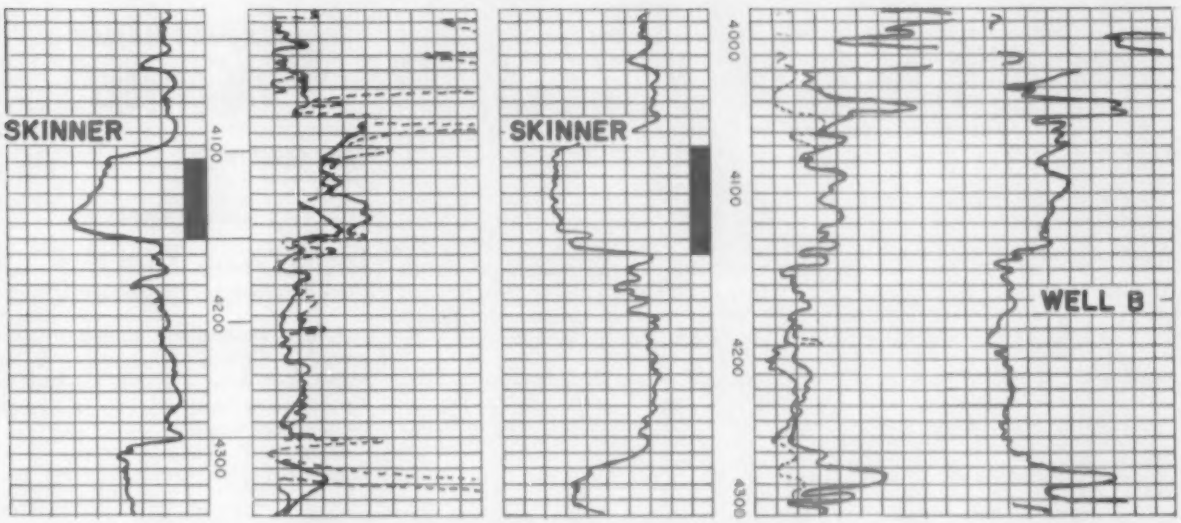

Fig. 3—Skinner sand production was postulated after examination of the electric log of the 1 Maltby, a dry hole (left). A new test (Well B) confirmed this conclusion with a daily production of 8 million cubic feet of gas per day.

the Misener sands between the Woodford shale and Hunton limestone.

15. Thin, porous streaks within a thick, dense, and massive limestone.

16. All formations that gave up mud or oil-cut mud and no salt water on drill-stem tests.

17. All shaly formations that habitually gave poor drill-stem tests but respond to fracture treatment.

18. Areas where a few electric logs are now being obtained but where early drilling was by cable-tool methods.

19. Cased off zones above a producing formation.

20. Extensions to proven areas.

21. Literally—electric logs of all formations that are not definitely known to be water bearing.

These are the essentials. The technique is known and the backlog of electric logs is generally available.

Typical Discoveries

Typical among discoveries resulting solely from analysis of logs run in plugged and abandoned holes are the following three examples. Factors involved and the approach to the analysis leading to the discovery were different in each case:

Southeast Coyle Pool (Fig. 1)

Plugged well . . . State B-1, SE SE SW Section 16-17n-1e, Logan County, Oklahoma. The well was plugged in December 1945 with no shows in Wilcox sand at total depth of 5,068 ft.

Old log analyzed . . . July 1951. Analysis indicated the Wilcox sand interval 5,050-66 ft. was oil bearing and should be tested. One function of the analysis was the determination of a probable oil-water contact. Subsequent drilling in the pool proved that the water level was actually about 10 ft. lower than predicted.

Recompletion of plugged well . . . In October 1951, the old hole was cleaned out and pipe cemented to total depth. Perforations were made with 60 shots from 5,050 ft. for an initial production of 225 bbl. of oil per day through a 13/64-in. choke.

Reserves . . . In all, 18 wells were drilled in the pool for Wilcox production. An early reserve estimate gave 1,600,000 bbl. of recoverable oil. The pool has already produced this much and will probably produce twice the estimate. The state B-1 well has produced 150,000 bbl. of oil and is still flowing.

Prairie Valley Pool (Fig. 2)

Plugged well . . . Hempkin 1, SW SW NE Section 5-23n-4w, Garfield County, Oklahoma. The original hole was plugged at a total depth of 6,196 ft. in the Wilcox sand in December 1946. No shows were observed according to all information.

Old log analyzed . . . January 1952. The analysis indicated probable oil production in the First Wilcox sand section, oil or gas-distillate in the porous parts of the Mississippi lime section, and shows in a few thin shallower sands. A later analysis of the Marshall section indicated probable oil production.

Recompletion of plugged well . . . In December 1952, the old hole was cleaned out and pipe cemented to total depth. The Wilcox sand produced oil and water and was plugged off.

The Mississippi lime was perforated with 58 shots from 5,455 to 5,584 ft. for gas and gas-distillate production. A huge gas-distillate producing reserve was opened up as subsequently proven. The Marshall sand, now one of the most prolific formations in the pool, was later perforated and tested for oil production. Subsequent drilling to north and west discovered a thick, prolific, Misener sand oil-producing section. The electric log was not instrumental in this discovery but later proved the oil-water contact.

Reserves . . . Fourteen wells have been completed in the pool to date. Some are producing from the Mississippian, some are producing oil from the Misener, and some are producing oil from the Marshall sand. Some wells are dually completed. One reserve estimate gives the Hempkin well 200,000 bbl. of recoverable oil production. An offset well is given 100,000 bbl. and these two wells with one other offset are given 1,500 M.M.c.f. of gas.

Remarks . . . Two wells, subsequently drilled in the pool, and apparently plugged because of a discouraging drill-stem test, have been recompleted by independent operators for commercial gas-distillate production.

South Tonkawa Pool (Fig. 3)

Plugged well . . . Maltby 1, NE Section 25-24n-2w, Noble County, Oklahoma. The well was plugged in July 1945 at a total depth of 4,522 ft. in the Wilcox section (Well A, Fig. 3).

Old log analyzed . . . May 1953. No shows had been reported in a 50-ft. section of Skinner sand which was analyzed to be oil or gas productive. Study of logs of other dry holes in the vicinity permitted the mapping of a

large sand body shaling out updip to the east, shaling out to the north and to the south. The sand area apparently covered the major part of two sections. Another plugged hole updip to the east had 30 ft. of sand that also was analyzed to be oil or gas productive.

Pool discovery . . . The Maltby well was not reopened but a new well was drilled in the SE NW NE of Section 25-24n-2w, July 1953 (Well B, Fig. 3). Only the bottom 10 ft. of Skinner sand was perforated for an initial production of 8 M.M.c.f.d. of gas with 16 bbl. of distillate. In the meantime, the updip plugged hole in Section 20-24n-1w was recompleted—despite lack of shows in the samples—for a gas-distillate well from the same sand, thus proving a large gas-distillate producing area between the two wells.

Reserves . . . Ten gas-distillate wells have been completed to date and at least 2,000 acres are proven to be gas-distillate productive from Skinner sand. One reserve estimate for two 160-acre tracts in the center of the pool gives a net recovery of about $800,000.

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Exploration Highlights

MID-CONTINENT

OKLAHOMA

Logan County Adds New Gas-Distillate Discovery

A new gas-distillate discovery is reported in Central Oklahoma at J. M. Shields 1-A State, NE NE SE 36-16n-1e, 15 miles southeast of the city of Guthrie (see map).

Open flow potential through 5-in. casing was 21,700 M.c.f. of gas per day and 11 bbl. of distillate per M.c.f. through perforations in the Misener sand at 4,940-49 ft. Shut-in tubing pressure was 1,770 psi. Shut-in casing pressure was 2,106 psi. On a ¼-in. choke the discovery well flowed at the rate of 2,879 M.c.f. per day with flowing pressure at 1,742 psi.

Central Oklahoma has a new gas-distillate discovery, 15 miles southeast of Guthrie.

On ½-in. choke the strike flowed 9,361 M.c.f. per day with flowing pressure at 1,340 psi. Reaves Drilling Co. of Cushing drilled the success with 5½-in. casing set on bottom at 5,365 ft. Shields is preparing to lay 3½-in. pipeline to connect with Cities Service Oil Co.'s 12-in. main, 2½ miles from the discovery.

Key Stratigraphic Test Abandoned in Pittsburgh

Signal Oil & Gas Co. and Hancock Oil Co. have abandoned their key stratigraphic test in southeastern Oklahoma.

The 1 Hoehman was carried to an approximate depth of 8,700 ft. and was drilled under the name of the Southwest Exploration Co. Other firms having interest in the wildcat were Fuller-

ton Oil Co., Union Oil Co. of California, and certain individual interests.

Because of the unusual features of the area, much interest has been generated in oil circles concerning the possibility of an oil strike in this area where overthrusting believed to cover several hundred thousand square miles was thought present. The objective was a facies of the Arbuckle series which is thought to exist under this overthrusting, but continued exceptionally hard drilling caused the operators to suspend the well at this location.

At the present time, the entire lease block consisting of some 200,000 acres is being restudied with the possibility that a second test may be undertaken sometime in the future.

Core Gets Thick Sand At the 1 Griffin, Marshall County

Marshall County's significant wildcat prospect, Sinclair Oil & Gas Co. et al 1 Griffin, SE NE NE 16-5s-5e, north of Madill, has cored a thick section of sand in the basal Oil Creek.

The section topped at 7,442 ft., with first porosity noted at 7,448 ft., gave cores showing more than 100 ft. of sand with good stain and odor. The cores were taken from 7,451 ft.

Offset Well in Cleveland County Reports Big Flow

A high flow rate is reported at a Cleveland County offset well, Continental Oil Co. 1 Parkhill, NE NW SW 14-8n-1w, Southwest Clear Brook field.

The well indicated 2,124 bbl. of oil per day on 1-in. choke from perforations in the Wilcox sand at 7,092 to 7,104 ft. The flow was based on a 2-hour test.

Stanolind Finals Garvin County Bromide Strike

Garvin County has a new Bromide sand pool at Stanolind Oil & Gas Co. 1 Pitchlynn, SE SW SE 14-4n-2w, east of Maysville Townsite pool.

The discovery well is several hundred feet higher than Maysville Bromide field, structurally. It flowed 1,066 bbl. of 40°-gravity oil per day on ¾-in. choke from perforations at 5,936-44 and 5,972-78 ft. Gas-oil ratio was 1,500:1.

Bradley extension . . . Magnolia Petroleum Co. 1 Hall, C SE NW 18-4n-4w, on the Garvin County side of Southeast Bradley district, was completed in the Springer sand for 387 bbl. of flowing 37°-gravity oil per day on ¼-in. choke. Gas-oil ratio was 437:1.

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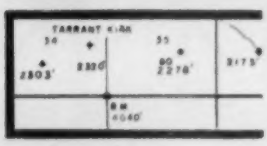

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8,148-62 ft. have been treated at Cities Service Oil Co. 1 McCoy, C NE NE 17-4n-4w, between Erin Springs and West Lindsay fields.

The well flowed 340 bbl. of load oil and 140 bbl. of new oil in 13½ hours on ½-in. choke. The lower Hart sand at 8,248-62 ft. also paid off.

KANSAS

State Assured One of Best Strikes in Years

Kansas seems assured of one of its best oil discoveries in several years. It is Imperial Drilling Co.'s 1 Hoof, NE

NE SW 9-10s-23w, Graham County, on the western flank of the Central Kansas uplift.

The Lansing-Kansas City strike is flowing at the rate of 42 bbl. per hour. Perforations are at 3,881-85 ft. After acidization the well flowed at the rate of 40 bbl. per hour for 8 hours. The 42-bbl. per hour flow came at 3,865-69 ft. after 5,000 gal. acid.

The discovery has two offsets. On the east Birmingham-Bartlett 1 Johnson "E," NW NW SE 9-10s-23w, is preparing to take tests after several good drill-stem tests reported in the Lansing. Location for a north offset has been spotted in SE SE NW 9-10s-23w, by Imperial at 1 Hoof "B."

Committee Names New Pools In Several State Areas

In Barber County Gudeman pool was opened at Aurora Gasoline Co. 1 Gudeman, NW NW NE 10-35s-10w. It is completing in the Viola lime. Also in Barber Anschutz Drilling Co. 1 Lonker, NE NE NE 25-32s-13w. The Mississippian discovery opened Medicine Lodge North field.

Barton County has a new pool at Bissell Point, opened by Schermerhorn Oil Corp. 1 Bissell Point, NW SE SE 10-19s-13w. It is completing in the Lansing. Sunny Valley Southwest pool was opened by Harms & Burt 1 Murphy, NE NE NE 23-20s-13w. It has Lansing production. Also in Barton Claflin pool was opened at Francis Raymond 1 Simmons, SE SE SW 3-18s-11w. It also has Lansing production. Barton has still another new pool at Southwest Sand Rock, opened at Rocket Drilling Co. 1 McDonald, SE SW NE 34-20s-13w. Lansing is the pay.

Sinclair Oil & Gas Co. 1 Combrink, C NW SE 22-33s-21w, opened North Harper Ranch pool in Clark County. It is a shut in Morrow gas discovery.

Graham County has two new pools, Prairie Glen and Holley. Petroleum, Inc. 1 McCall "B," NE NE SW 25-10s-23w, is a Lansing producer. Empire Drilling Co. 1 Keith, SW SW SW 3-9s-24w, opened Holley pool with Lansing pay.

In Harper County North Dusenbury pool was opened by E. F. Wakefield at 2 Dusenbury in NE NE NW 34-31-9w. It has Mississippian production. Kingman County has a new Mississippian gas pool at Rupp-Ferguson 1 Hartshorn, SE SW SW 36-29s-9w, opening Zenda pool. Also in Kingman West Broadway field was opened at Greenland Drilling Co. 1 Viney, NE

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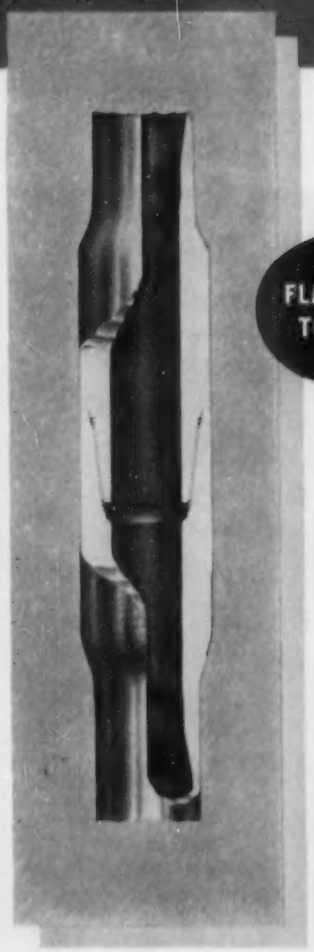

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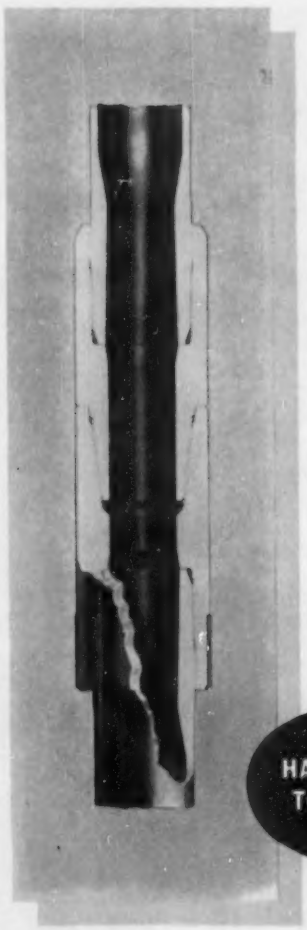
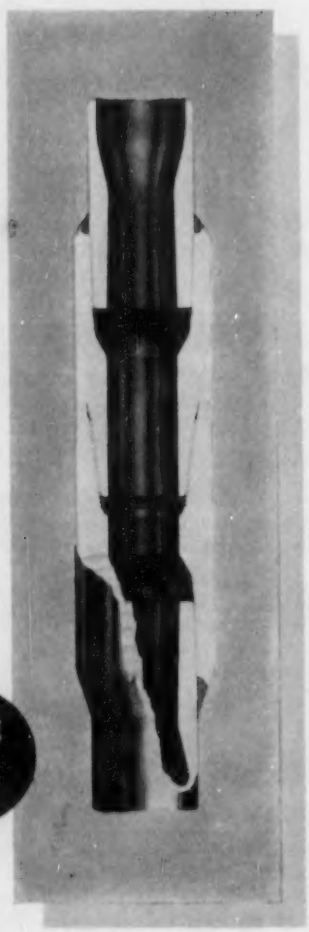


HAND APPLIED TO THE PIPE



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NE NW 19-28s-5w as a Mississippian producer.

South Durham pool was opened in Marion County by Anderson-Prichard 1 Hett, SW NE SW 3-19s-2e. It was completed for 43 bbl. of oil per day from the Simpson. Lovett field opened in Pawnee County at Rine Drilling Co. 1 Lovett, NW NW NW 35-22s-15w. It is completing in the Lansing lime.

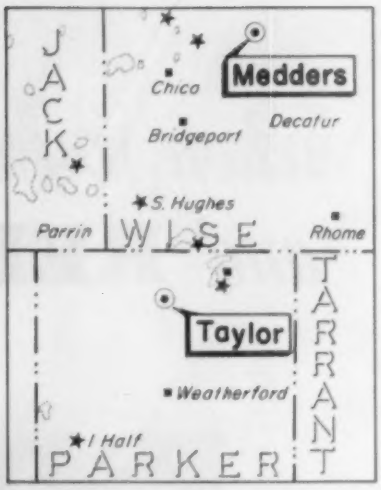
The most significant new discovery named in Kansas is new Grigston field in Scott County. W. L. Hartman 1 Rush, NW NW NE 10-19s-31w, is the first Arbuckle production in western Kansas.

NORTH TEXAS

Wise and Parker Counties Gain Oil Discoveries

● Week's new oil prospect included the two counties, with discoveries circled on the map. Exploration work in this area, especially in Wise County, has picked up over the past several months. Current drilling wildcats are indicated by stars.

The new Pennsylvanian Bend prospect for Wise County is Tom B. Medders 1 Clark, a rank wildcat 10 miles from nearest production, in Abel Hodges Survey, A-370. A drill-stem test at 6,311-6,451 ft. had gas in 3½ minutes and oil in 23, which gaged 109.68 bbl. in 13 hours and 13 minutes. Gravity was 44° and flowing pressure ranged from 850-1,925 psi. Drilling continued below 6,641 ft.



● Ben J. Taylor 1 Carr, north of Weatherford in Parker County, has been completed as a flowing Strawn discovery. Operators drilled to 5,087 ft., then backed up to test on perforations at 3,110-20 ft. Initial potential was 144 bbl. of 42° oil a day through 5/16-in. choke.

Grayson County prospect . . . Lone Star Producing Co. 1 Charles O'Hagan, 5 miles northwest of Sherman, was ready to complete as a discovery after flowing 119.28 bbl. of 30° oil the first 8 hours of a test through ¾-in. choke. Tubing pressure was steady at 60 psi. and gas-oil ratio was 547:1.

Lone Star's well was producing from Cordell sand at 8,942-80 ft. Location is in the J. S. Coffee Survey, A-232, 3 miles southwest of nearest similar production in Sherman field.

New pay in Callahan . . . The new Herr-King field (Moran sand) 5 miles northeast of Baird has been given a second pay. S. C. Herring Drilling Co. 2 Williams was completed for 136.76 bbl. of oil in 12 hours through ¼-in. choke, from Cross Cut sand at 2,428-38 ft. Tubing pressure was 275 psi., gas-oil ratio 540:1 and gravity 44°. Top of the sand was 2,426 ft.

BASIN AND RANGE

NEVADA

Northeast Nevada registered a new wildcat to replace the unsuccessful test of Bandini Petroleum Corp. in Railroad Valley, 7 miles north of Shell Oil Co.'s recent oil discovery. Bandini 1 Harris-

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Government, in 25-10n-57e, was abandoned at 5,552 ft. after having only slight gas shows at 4,300 ft.

The new wildcat was in Eureka County, about 35 miles south of Carlin. Operators for 1 Government, in 3-27n-52e, are James Ebert and Edward Nepple.

In Railroad Valley, Shell staked 35-35 Eagle Springs in NW NE SW 35-9n-57e, about ¼ mile south of the 1 Eagle Springs discovery. The latter is currently producing about 250 bbl. daily from the interval 6,450-6,730 ft. In NE SE 2-7n-56e, Shell 2 Eagle Springs had reached a depth of 10,171 ft. but the operator was plugging back after being unable to recover the remainder of a fish below 9,597 ft.

PERMIAN BASIN

WEST TEXAS

New Structure Indicated In Northwest Ector County

Cities Service Oil Co. had prospects of a new deep producing structure at its 1-0 TXL, 21-45-T1N-T&P Survey, in northwestern Ector County. The well was completed dually from the

Ellenburger and Fusselman for calculated flowing potentials of 1,575 and 1,117 bbl. daily, respectively.

Ellenburger pay was open hole at 9,422-9,509 ft. A 7-hour test through ¾-in. choke produced 325.95 bbl. of 44° oil, under pressure of 200 psi. and gas-oil ratio of 788:1.

Perforations in the Fusselman at 8,294-8,326 ft. made 262.42 bbl. of 39° oil in 4 hours through ¾-in. choke, with casing pressure at 380 psi. and gas-oil ratio of 1,050:1.

The new well is in an area of Permian production, 1½ miles south of Ellenburger and Devonian wells opened last year on Cities Service' Cummins leases. Operators believe they have a new structure since the two areas are

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separated by a Clear Fork producer which was dry in the lower formations.

Emma came in high . . . J. Ray McDermott & Co. 1-21578 University, north extension to Ellenburger pay in the Emma pay of southern Andrews County, found the Ellenburger structurally higher than any well in the field, and developed a flow rate of 130 bbl. hourly on drill-stem test.

Top of the Ellenburger was 12,184 ft., minus 9,000 ft. The drill-stem test was run from 12,187-12,284 ft., using ⅝ and 1-in. chokes and 1,400 ft. of water blanket. Water surfaced in 15 minutes and oil in 20, flowing for 2 hours at 130 bbl. an hour. Bottom-hole flowing pressure was 5,250 psi., increasing to 5,960 psi. in 40 minutes. Surface flowing pressure was 600 psi. Operators planned to drill to 12,484 ft. and run casing for completion.

Location is in 36-10-University Lands Survey. B. B. M. Drilling Co. will move the rig to new location in the same section to drill 2-21578 University, and Loffland Brothers will move in to drill 3-21578 University. Both new tests are for McDermott. Five other deep tests are reported active in Emma field.

Dora Roberts new pay . . . A high flow of oil from the Pennsylvanian Bend section has added a second pay to the northernmost pool along the Dora Roberts trend in Midland County. Previous Pennsylvanian production has been in the War-San area.

The new pay discovery is Forest Oil Corp. and Cities Service Oil Co. 2-B-1 Roberts, a southwest offset to the Ellenburger discovery, Section 42, Block 41, T2S-T&P Survey. Top of the Bend was 10,120 ft., minus 7,266 ft., which was said to be 44 ft. low on that marker to the 1-B-1 Roberts. Drill-stem test from 10,104-10,263 ft. had oil in 60 minutes and tanked 35 and 25 bbl. in two hourly gages through ⅝-in. bottom choke.

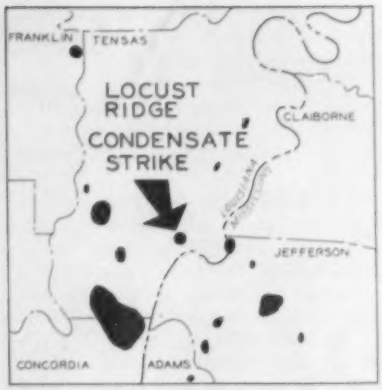
ARK-LA-TEX

NORTH LOUISIANA

New Sand Gas-Condensate Strike Finaled in Tensas

H. L. Rowley has completed a new gas-condensate discovery in Tensas Parish, east-central Louisiana.

The 1 M. D. Adams, C NE SE 20-10n-11e, ⅞ mile southeast of Locust Ridge, flowed 70 bbl. of 58°-gravity condensate plus 1,250 M.c.f. of gas daily on 10/64-in. choke. Perforations were at 9,076-96 ft. in the Massive sand of the lower Tuscaloosa. It is also



thought that the second lower Tuscaloosa sand is productive.

The discovery well of the new pool is 144 ft. higher on top of the lower Tuscaloosa than Jett and Associates 1 Harper, Rodney Island field in 12-10n-12e. It is 114 ft. higher than the discovery well of Buena Vista field across the Mississippi River in Jefferson County, Mississippi.

November Discoveries

Exploratory work in North Louisiana accounted for two new gas pays. One of the new-pay hits was in Caddo Parish's Bethany field; the other in DeSoto's Spider field.

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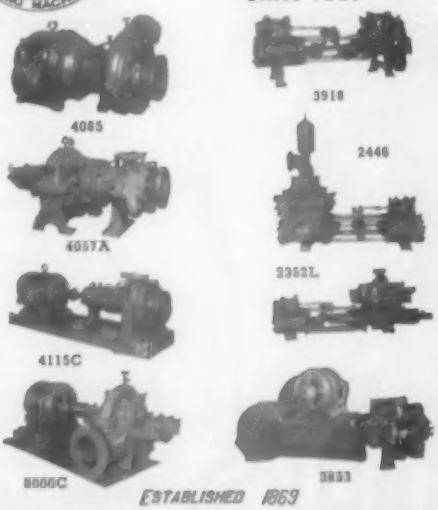

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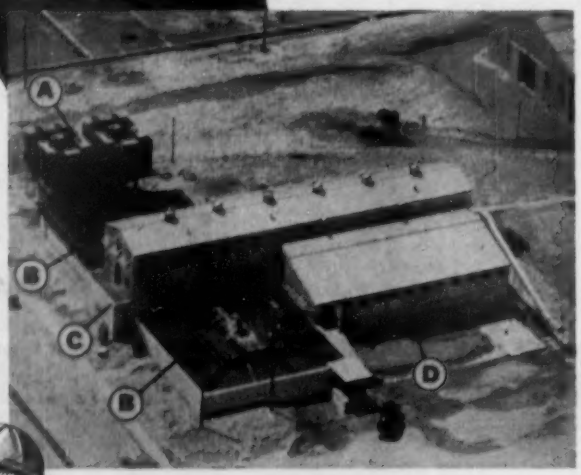

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Bethany . . . Union Producing Co. 1 Querbes, 17-16n-16w, is the first Cotton Valley "D" sand well in Bethany field. It was completed for a calculated open flow of 7,000 M.c.f. per day from perforations at 8,535-53 ft.

Big Bethany field, which covers parts of East Texas and northwest Louisiana, has pay in the Nacatoch, Paluxy, upper Glen Rose, Rodessa, Sligo, and Travis Peak.

Spider . . . McAlester Fuel Co. and S. Stuart A-1 Scurlock, 22-12n-14w, DeSoto Parish, flowed 1,470 M.c.f. of gas per day plus 1½ bbl. of condensate on ¼-in. choke from perforations at 2,948-64 ft. in the Paluxy.

ARKANSAS

Pipe Set at Pope County Gas Prospect

Casing has been cemented for production tests of gas shows found in Murphy Corp. 1 Barton, 10-8n-19w, 1 mile south of Moreland in the south-central part of central Arkansas' Pope County.

The gas shows were found while drilling with cable tools at 3,988 ft. The sand possibly extends to 4,057 ft. Some observers estimate the gas output at 3,000 M.c.f. per day through open 10¾-in. surface casing. The sand is of Atoka-Pennsylvanian age.

November Discoveries

Two shallow oil discoveries were made in Arkansas during November. One new pay strike was reported.

A Buckrange discovery was completed in Lafayette County, southwest Arkansas, at Olin Gas Transmission Corp. 3 Olin-IPCO, C NE NE SE 21-19s-24w. The discovery well opened Dooley Creek field, 3⅛ miles southeast of Bradley, Arkansas. The well produced from perforations at 2,771-74 ft. It flowed 20 bbl. of oil per day on ⅛-in. choke. Gas-oil ratio was 12,000:1.

● E. G. Bradham completed an oil well 1⅛ miles southwest of Nick Springs field in Union County. The 1 Horton, C SW SW SW 1-18s-15w, finaled in the Nacatoch at 2,160-2,266 ft. It pumped 21 bbl. of oil per day. The importance of this discovery is the shaly character of the Nacatoch sand in this area.

● W&S Oil Co. 1 Wheelis, E½ SE NE 16-16s-24w, is a Tuscaloosa oil-pay discovery in Lafayette County's West Lewisville field, southwestern Arkansas. The well pumped 20 bbl. of oil and 180 per cent salt water from perforations at 2,845-47 ft.

GREAT LAKES

MICHIGAN

Two Wildcats Get Close Look in State

Michigan oilmen were watching two wildcat wells—one in the so-called Thumb area, Tuscola County—a Richfield discovery in the area of the shallower Akron "sour zone" oil pool, and another on the west side of the state which appears to be a sure fire Traverse oil discovery in Ensley Township, Newaygo County.

The Thumb area Richfield oil producer, Byron A. Bartlett 1 Elek, NE NW SE 23-14n-7e, Wisner Township, has been averaging a flow of about 31 bbl. of oil a day from Richfield pay logged at 3,744-54 ft., while deepening through the Richfield section has been in progress. The base of the Richfield has been logged, it was believed, at about 3,848 ft., but well is destined to be deepened to about 3,900 ft., before being plugged back, tested and acidized with stage treatments in the oil-showing horizon. A small amount of water, 250 ft. in 22 hours, showed from 3,860-70 ft.

● The new Traverse oil discovery, James J. McGerry, Trustee 1 Cook, NE NE NW 7-11n-11w, in Newaygo County, was delayed in further testing and acidization in the Traverse with a faulty casing seat around 5-in. forced operators to squeeze cement. However, this wildcat, which logged Traverse lime top at 2,431 ft., and was bottomed out at 2,441 ft., flowed for 3 days through tubing before being recemented. Daily flows were reported at 27, 24, and 21 bbl. Oil pay showed at 2,440-41 ft. and hole carried 700 ft. of free oil natural before casing was run, on an overnight test, and about 1,500 ft. in the same length of time after casing had been set. This wildcat, located about 2½ miles south of Croton Traverse oil pool, Newaygo County, may prove to be the most important Michigan Traverse oil strike to date in 1954.

APPALACHIAN

OHIO

● National Gas Co. 1 Walter Stuhr, Section 14, Royalton Township, a ½-mile north extension, gaged 320 M.c.f. of gas per day in the Newburg sand at 2,972-3,022 ft., and 600 ft. of oil at 3,091-92 ft. After fracturing, the gas gaged 225 M.c.f. and the oil 292 bbl. in 24 hours.

● At San Toy, Ohio Fuel Co. 1 E. D. Mahon, Section 36, Bearfield Township, Perry County, topped the Clinton sand at 3,854 ft., and finished at 3,872 ft., still in sand. A gage of 425 M.c.f. natural increased to 1,330 M.c.f. of gas when shut in after shot.

● E. H. Everett 1 Mast, Lot 16, Perry Township, Licking County, an outside location to Hanover field, gaged 700 M.c.f. of gas and made 45 bbl. of oil in 24 hours after fracturing from Clinton sand at 2,942-86 ft.

PENNSYLVANIA

● In Grant Township, Indiana County, Southwest Pennsylvania, Fairman Drilling Co. 1 Herb Gernandt, rank wildcat was dry, Tully 6,901-11 ft., Oriskany sand 7,665-71 ft., TD 7,687 ft.

● In Banks Township, Keta Oil & Gas Co. et al 1802 Farmers & Miners Trust Co., recorded the Oriskany sand at 7,564 ft., and shut down at 7,586 ft., for motor repairs.

WEST VIRGINIA

● In Fork Lick district, Webster County, West Virginia, Bolair Gas Co., has located 1 E. N. Norton, wildcat, elevation 2,271 ft. It is on the Webster Springs Quadrangle on Sandy Run of Gauley River, 3.91 miles south of latitude 38 degrees 30 minutes and 1

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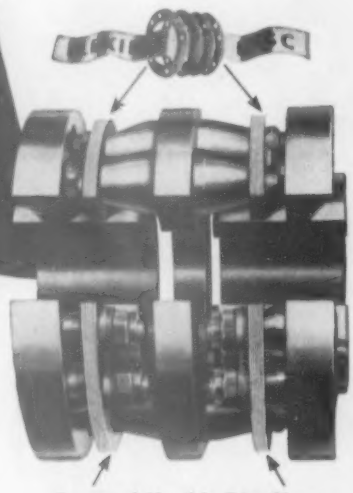

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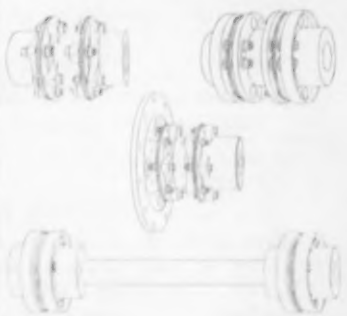

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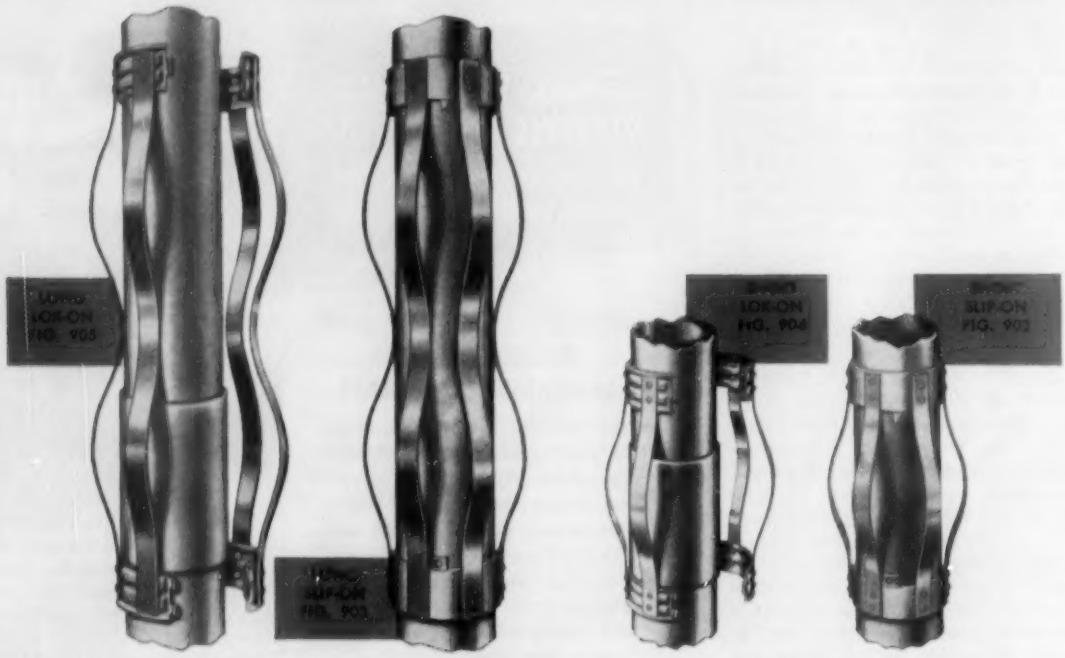

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EASTERN KENTUCKY

On Johns Creek and in the Pike County sector of Big Sandy gas field, Kentucky West Virginia Gas Co. has completed 1030 Robert Williams for a Devonian black shale gas producer. Test gaged initially, after shooting with 8,325 lb. of gelatin, 622,000 cu. ft. of gas daily. Shale was topped at 2,860 ft. and drilled to a total depth of 3,679 ft. An 11-hour rock pressure of 500 psi. was recorded.

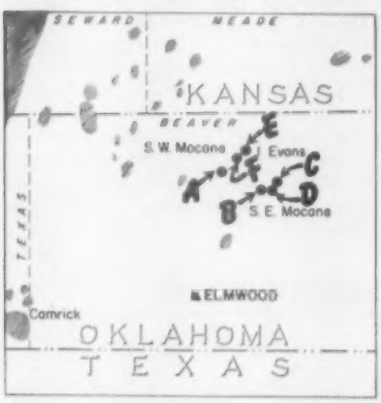
HUGOTON EMBAYMENT

OKLAHOMA PANHANDLE

Beaver Is the Panhandle's Most Active Area Currently

The Oklahoma Panhandle's busiest county at the present time is Beaver. The big county is enjoying an active exploration program with the Pennsylvanian and Mississippian being the prime targets.

Nearly 3 years ago Sinclair Oil & Gas Co. started the play at 1 Earl Maple, SW NE 26-5n-24eCM. This



discovery got Mississippian gas at 857 M.c.f. per day. The discovery well opened Southwest Mocane field (A on map).

Last spring The Texas Co. 1-A Barby, NW NW 2-4n-25eCM, opened Southeast Mocane field (B on map). The well was finaled in the Morrow sand with 6,000 M.c.f. of gas per day following acidization. Perforations were at 6,752-64 and 6,776-86 ft. This area was later extended 2 miles northeast at 1 Barby (C on map). The well flowed 15,300 M.c.f. per day from the Morrow at 6,894-6,920 ft. Cabot Carbon Co. had a dry hole, the area's first, at 1 Barby A in NW NW 1-4n-25eCM

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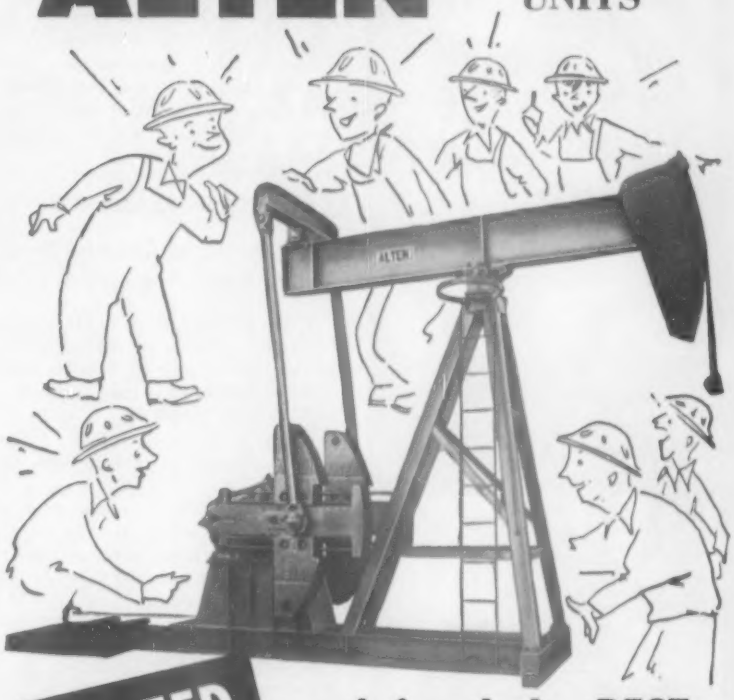

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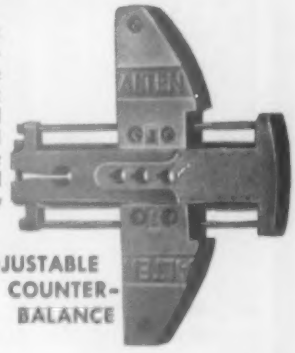

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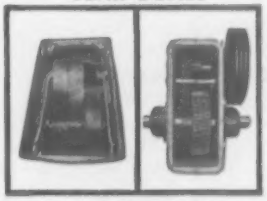

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(D on map). The company has recently reentered the dry hole and has Morrow gas production assured. It flowed 17,000 M.c.f. per day after fracturing.

Northwest of this Southeast Mocane development at (E on map) United Producing Co. 1 Evans was completed for a calculated open flow of 20,200 M.c.f. of gas per day from Chester (Mississippian) perforations. Testing in the Morrow at the 2 Evans (F on map) is currently under way. The well made 3,000 M.c.f. per day natural on tests.

TEXAS PANHANDLE

New Roberts County Strike Takes Back Pressure Potential

Cree Drilling Co. 1 Flowers-Shell-Flowers, 18 miles northwest of Miami in the central part of Roberts County, is an important new gas discovery. The well flowed 1,500 M.c.f. of gas per day from Permian brown dolomite. After acidization it flowed 3,000 M.c.f. per day.

This discovery will become the third Permian producing area in the Panhandle. It is 9 miles north of Quinduno field and about 23 miles north of Hugoton-Panhandle field.

PACIFIC COAST

CALIFORNIA

Prospective New Pool For Tejon-Grapevine

Drilling & Production Co. was attempting to establish a new deeper pool on the northwest flank of the Tejon-Grapevine field, Kern County. Between 7,000 and 7,044 ft. its 33-33 J.V. cored approximately 25 ft. of oil sand. At 7,066 ft. drilling was halted to test the zone's productive possibilities.

The wildcat, in SE NW 33-11n-19w, apparently missed the Olcese sand which was its primary objective. About 1 mile northeast of the test, Reserve Oil & Gas Co. has completed 10 good producers in the 5,600-ft. sand. This pool's productive limits were extended ¼-mile south upon completion of Lake Oil Co. 1 Crane in SW NW Section 34. It flowed 300 bbl. daily of 30°-gravity crude from the Olcese, topped at 5,695 ft.

Ventura Tests Watched

Two Ventura wildcats being watched were Union Oil Co. 1 Tassano and Sunray Oil Corp. 1 Ohio-Bailard-McGrath. The former, in 23-2n-21w or about 4 miles northeast of the expanding Oxnard deep development, was preparing to set 7-in. casing after logging and sampling shows above 7,835 ft. The Sunray test, about ¾-mile southeast of the deep Colonia pool being developed by Standard Oil Co. of California at West Montalvo, was of interest because of its depth. Unable to clear the hole between 13,059-13,230 ft., Sunray set 7-in. pipe at 13,000 ft.

Oak Canyon Outposts Testing

Two wildcats south of Oak Canyon field, Los Angeles County, were testing shallow shows. Richfield Oil Corp. 1 Lechler in NE SW 6-4n-17w, 1¼ miles southwest, was testing near 1,300 ft. after drilling to 8,965 ft. F. M. Boswell Associates 1 Foley in NE SE Section 6, was preparing to run pipe after drilling to 2,802 ft.

Pipe Set In Hancock Test

At its wildcat 1½ miles northwest of the new Sunset Beach field, and about 1 mile southeast of Seal Beach field, Hancock Oil Co. set 7-in. casing at 8,400 ft. after drilling to 8,976 ft. Several possible oil sands reportedly were found below 7,600 ft. Location of 1 Alamitos Land is in 13-5s-12w.

Airport Activity Increasing

The Texas Co.'s 8,500-ft. discovery at Long Beach Airport continued to attract new operators and additional activity. A total of 11 rigs were drilling and from the number of new locations staked it appeared the number would soon reach 14. Two new tests were those of Herley-Callahan Operations, a southeast outpost, and Turner & Associates 1 Community, a west edge well. The latter is to start about December 15.

EASTERN INTERIOR

WESTERN KENTUCKY

Stouder Drilling Co. 1 Priest, 6-P-25, near Zion in Henderson County, flowed clean oil on a drill-stem test of the O'Hara lime at 2,254-59 ft. The discovery prospect is 2 miles southwest of Zion pool.

ILLINOIS

In Saline County Oil Management, Inc., and Calvert Drilling Co., and Mahutska Oil Co. 1 Julius Bona Unit, NW SW NW 23-8s-5e, 5 miles northwest of Harrisburg, is being tested after fracturing. It is a 7-mile stepout wildcat.

● W. C. McBride 1 Flanders, 2 miles northeast of Eldorado in Saline County, SW NE SE 10-8s-7e, might be the best Saline County has had in

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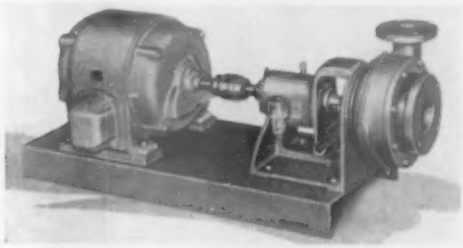

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Sand is deposited into blind cage above the plunger and is discharged every stroke of the pump. The bottom of plunger is sealed to eliminate slippage. Easy on surface equipment. Lower lifting cost with Sealed-Off Pumps.

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Fig. 700A Heavy Duty Seating Device

Fig. 800 Heavy Duty

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some time. The wildcat is coring in the Tar Springs. It had two good drill-stem tests in the Palestine sand at 1,971 to 1,988 ft. and in the Waltersburg at 2,116-39 ft. The wildcat is 1 mile from production.

WESTERN CANADA

Three Western Provinces Record New Discoveries

Discoveries in Western Canada last week were distributed between Alberta, Saskatchewan, and British Columbia. Alberta's came in the Bretona and Savanna Creek areas, Saskatchewan's were in the Nottingham and Tompkins areas, while the lone British Columbia well was in the Halfway area of that province.

British Columbia . . . The well in the Halfway area of B.C., White-Lloyd 1 Halfway, LSD 16, 2-87-25w6, discovered light-gravity crude oil in the Cadomin zone of the Lower Cretaceous. This venture reportedly flowed 45°-gravity oil to the surface. It is understood that a drill-stem test covering a 75-ft. interval down to 2,885 ft., flowed light-gravity oil at the rate of between 5 and 10 bbl. per hour.

SASKATCHEWAN

Nottingham area . . . Imperial 9-26-4-32 Nottingham, LSD 9, 26-4-32w1, 9½ miles southeast of the 4-35 Alida discovery well, is 20 miles northwest of Pierson oil field.

Mission Canyon tested 600 ft. of water-free oil at 3,530-40 ft.

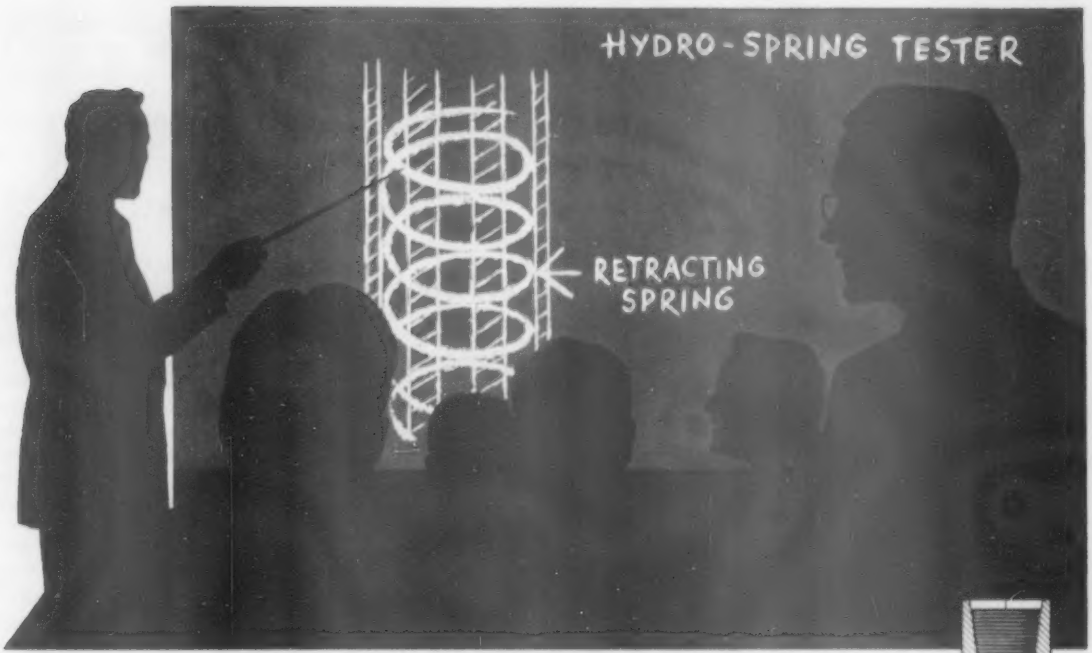
Tompkins . . . Socony-Woodley-Southern 30-14 Tompkins, LSD 14, 30-13-20w3, got gas in the upper Shaunavon formation. Gas on test reached a flow rate of 7,000 M.c.f. per day.

ALBERTA

Bretona area . . . This province's Bretona wildcat, drilled by Banff Oil, Ltd., and Richfield Oil Corp., had previously discovered gas in the Viking.

Further drilling and testing has produced the discovery of gas and 32°-gravity oil from the basal quartz. This well is the Banff-Richfield 16-33 Bretona, LSD 16, 33-51-23w4. Discovery in that later zone came on tests of interval 3,840-55 ft. Gas flowed in 2 minutes at 1,700 M.c.f. per day. Oil was recorded on the next test at 3,854-64 ft. Pipe recovery was 520 ft. of oil.

Savanna Creek . . . Husky-Northern-Target 1 Savanna Creek, LSD 12, 20-



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14-4w5, got gas in the Mississippian-Rundle. The wildcat hit is 25 miles southwest of Turner Valley, 60 miles southwest of Calgary.

Gas flowed at the rate of 8 to 10,000 M.c.f. per day.

GULF COAST

SOUTHWEST TEXAS

Wilcox Gas Discovery at Piedre Lumbre Completed

Open-flow potential of Magnolia Petroleum Co.'s new gas discovery in Piedre Lumbre field, in northwestern Duval County, is calculated at 22,000,000 cu. ft. per day. Tested through ⅞-in. choke, it produced at the rate of 4,327,000 cu. ft. of gas and 82 bbl. of 56.5°-gravity condensate per day with pressure of 2,234 psi. Production is from Wilcox sand with perforated interval at 6,986-7,026 ft.

Shallow Sand Produces

Bellaire Oil Co., of San Antonio, has a shallow-sand oil discovery well in the Southton area, 10 miles south of San Antonio, in Bexar County, where its 1 Scoggins is pumping at the rate of 18 bbl. of net oil per day. The well makes about 2 bbl. of water per day. Gravity of the oil is 32.9°. Production is from open hole at 693-740 ft.

TEXAS GULF COAST

Two Sands Produce in Aransas Pass Wildcat

Arnold O. Morgan and B. A. Wales have opened a new oil and gas-condensate producing area 2½ miles northeast of Aransas Pass, in Aransas County, where they have completed their 1 Stanley as a dual-zone discovery well. It is slightly less than 1 mile southwest of a gas-condensate discovery well completed last July by Atlantic Refining Co.

Oil production in the new well is from the Marginulina E-4 sand with perforated interval at 7,804-07 ft. Potential flow through 10/64-in. choke was at the rate of 190.5 bbl. of 38.7°-gravity oil per day with pressure of 850 psi. and gas-oil ratio of 775 cu. ft. per barrel.

Gas-condensate production is from a shallower Marginulina sand with perforated interval at 7,675-80 ft. Open-flow potential was placed at 19,500,000 cu. ft. of gas per day with gas-liquid ratio of 76,500 cu. ft. per barrel. Gravity of the liquid is 65°. Shut-in pressure is 2,704 psi.

(Continued on page 232)

ROCKY MOUNTAIN

MONTANA

Northeastern Montana Wildcat Is Dry

Zach Brooks has abandoned 1 State, C SE SE 18-36n-44e, in the Richland area of Daniels County. Total depth is 8,819 ft., with the well in Ordovician at this depth. There were no significant shows reported. Other drilling through this portion of Montana has produced some shows, particularly in Devonian, but none have promised possible commercial production.

WYOMING

Swab Recovery Reported At Apparent Discovery

Trigood Oil Co., Casper has reported recovery of oil at the rate of 6½ bbl. per hour on swab test of Phosphoria at 1 Meeteetse Unit, C SE NW 28-49n-99w, Park County.

The wildcat was reported a possible discovery some time ago on the basis of unofficial reports of drill-stem test recovery of oil. No data has previously been confirmed by the operator, however. Trigood reported perforations at 11,234-54 ft. Top of Phosphoria was called at 11,332 ft. The apparent discovery is now testing on pump. The well is the second in this area to report shows in Phosphoria. Wilshire Oil Co. temporarily abandoned 1 State, C S½ SE SW 16-49n-99w in 1951 at total depth of 11,454 ft. The well had good shows in Phosphoria, but oil recovery was not commercial.

Pubco Development Co. reported a flow of gas at the rate of 2,300 M.c.f. per day on test of the Fruitland at 1 Ute Indian, La Plata County, Colorado. The discovery is 1½ miles north of U. S. Smelting 1 Brown, recently completed gas discovery which had a calculated open flow of 40,000 M.c.f. per day. Shell Oil Co. is testing at 2 Desert Creek in San Juan County, Utah. The Paradox discovery has been shut in for storage since flowing at the rate of 1,150 bbl. of oil per day.

Grieve Unit Wildcat Abandoned

Forest Oil Co. has abandoned a deep test on the Grieve Unit, 35 miles west of Casper in Natrona County. The well is 3-28-1 Unit, C NE SW 28-32n-85w. Total depth was 7,308 ft. Tops and tests have not been reported. The wildcat is 1½ miles southwest of Forest's Grieve Unit discovery, completed earlier this year for a gage of better than 1,000 bbl. per day through choke. A second well, offsetting the discovery has flowed at a rate estimated at 50-100 bbl. per hour on initial tests, and is now near completion. The discovery was in a sand tentatively identified as Cretaceous. The abandoned wildcat was scheduled to test to basement.

UTAH

Desert Creek Discovery Complete

Shell Oil Co. has completed 2 Desert Creek, SE SE 35-51s-23e, San Juan County Pennsylvanian discovery. A flow of 248 bbl. of fluid per hour, three-tenths per cent cut with sediment was reported through 14/64-in. choke. The well flowed at a rate of more than

(Continued on page 232)

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SOUTHWEST TEXAS

Hidalgo County: George H. Coates 2-A Englemann Community, Lot 1, Block 69, Las Mestenas Ranch Subd. Shut-in gas well, no gage. TD 6,650 ft. (Extends San Salvador field 1½ miles southwest.)

Taylor Oil & Gas Co. 3 Woods Christian et al, Share 16-A, San Ramon Grant. IP 3,650 M.c.f. daily, open-flow potential, and 20 BC per M.M.c.f., 57.3°, perforations 8,434-43 ft. TD 10,152 ft. (Extends San Ramon field.)

Kenedy County: Humble Oil & Refining Co. 6-B East, La Parra Grant. IP 97.52 BOPD, ⅛-in. 42°, perforations 6,674-79 ft. TD 9,000 ft. (New pay in Sarita field.)

Web County: Skelly Oil Co. 2 Martin, LIM & C 473, GC & SF 587-588. IP 16,350 M.c.f. daily, open-flow potential, GOR 53,700 cu. ft. per barrel, perforations 6,872-78 ft. and 6,886-96 ft. (Wilcox). TD 7,001 ft. (New pay in Aguilares field.).

TEXAS GULF COAST

District 2

Goliad County: H. R. Smith 1 Irby Unit, M. J. de YBarbo Sur., A-51. IP 335 BOPD, ½-in., 25.3°, perforations 9,273-9,310 ft. TD 9,318 ft. (New pay in Riverdale field.)

District 3

Chambers County: Tide Water Associated Oil Co. 1 State Tract 102, Galveston Bay. IP 205.48 BOPD, 9/64-in., 39.7°, perforations 8,593-97 ft. TD 12,277 ft. (New field—1½ miles north of Smith Point field.)

WEST CENTRAL TEXAS

Callahan County: S. C. Herring Drilling Co. 1 Williams, 1-C-T&NO Sur., 5 miles NE Baird. IP 179.6 BO in 16 hours, ¼-in., TP 150 psi., 44°, GOR 350, perforated Moran sand 2,482-96 ft. TD 2,546 ft.

Coleman County: L. H. Wilson 1 Sealy-Smith, 5-1-GH&H, 3 miles W Santa Anna. IP 41 BOPD, 16/64-in., TP 200 psi., 42°, GOR 600, pay 2,026 ft. TD 2,145 ft.

Stephens County: George S. Buescher 1 Winston, 41-5-T&P, 12 miles E Breckenridge. IP 26 BOPD, 6/64-in., TP 50 psi., GOR 300, 38°, perforated Burch Creek 1,920-24 ft. TD 1,990 ft.

Taylor County: Superior Oil Co. 1 Spratlen, 51-19-T&P, 3 miles SW Merkel. IPP 91 BOPD, 48°, low GOR, Ellenburger perforations 5,432-34 ft. TD 5,475 ft.

NORTH TEXAS

Archer County: E. R. Perkins 1-A Jones, H. Cox Sur., A-67, 6 miles S Wichita Falls. IPP 120 BOPD, 39°, GOR 450, Vogtsberger sand 4,700-05 ft. TD 5,433 ft.

Taubert & Harper 1 Turbeville, Blk. 169, J.W. Cain Sur., A-69, 9 miles NW Archer City. IPP 61 BOPD, 39°, Cisco pay 1,475 ft. TD 1,478 ft.

Clay County: Bridwell Oil Co. 23 Bridwell River Ranch, Blk. 102, Word & Houssell Subd., 4 miles NE Scotland. IP 144 BOPD, 8/64-in., 41°, TP 325 psi., GOR 550, Mississippian 5,572-84 ft. TD 6,055 ft.

Clay Oil Corp. 1-A Ridings, Blk. 5, Halsell Subd. 2, 6 miles SW Henrietta. IP 482 BOPD, 6/64-in., TP 500 psi., GOR 730, 42°, conglomerate 6,035-45 ft. TD 6,104 ft. Elev. 973 ft.

Wichita County: Hale & West 1 Nolen, J. W. Gresham Sur., A-80, 3 miles SE Iowa Park. IPP 63 BOPD, 43°, GOR 275, Canyon sand 2,871-82 ft. TD 4,284 ft.

Wilbarger County: Dublin-Kiel 1-CC Waggoner, 6-5-H&TC, 9 miles S Harrold. IPP 55.8 BOPD, 38°, GOR 400, Dyson sand 1,909-29 ft. TD 2,505 ft.

Wise County: Miles Production Co. 1 Parr, 2-3-Cooke CSL, A-156, 2½ miles NE Chico, IP 144 BOPD, 20/64-in., 41°, TP 225 psi., Caddo conglomerate 5,478-5,512 ft. TD 5,861 ft.

Young County: Paine Drilling Co. et al 1 Richie & Allen, AB&M Sur., A-14, 14 miles SE Graham. IPP 51 BOPD, 41°, GOR 275, perforated upper Strawn 1,638-42 ft. TD 1,689 ft.

WEST TEXAS

Andrews County: Phillips Petroleum Co. 3-B Embar, 5-44-T2N-T&P, 2 miles SE of Clear Fork production in Embar field. IP 976 BOPD. ½-in., TP 525 psi., GOR 980, 43.8°, Devonian pay 9,346 ft. New TD 9,680 ft. Top Devonian 8,903 ft., elev. 3,223 ft.

Crane County: Bankline Oil Co. 1 Rehmeyer, 14-1-H&TC, 5 miles NE Buena Vista. IPP 125 BOPD, 41°, GOR 112, Connell sand pay 5,670-94 ft. TD 5,897 ft. Ellenburger 5,802 ft., elev. 2,364 ft.

Crockett County: Stanolind Oil & Gas Co. and Dalton H. Cobb 1-A Clayton, 31-EF-GC&SF, 10 miles E Ozona. IP 1,300 M.c.f. calculated open flow, Ellenburger 8,535-65 ft. TD 8,971 ft. Top Ellenburger 8,475 ft., elev. 2,461 ft.

Howard County: Warren-Bradshaw Exploration Co. 1-A TXL, 41-30-T1S-T&P, 8 miles S Coahoma. IPP 57 BOPD, 31°, pay 2,640 ft. TD 2,744 ft.

Pecos County: Brown & Thorp Drilling Co. 1 Magnolia Fee, 3-212-J. H. Humphrey Sur., 2½ miles NW Owego. IP 2,150 M.c.f. calculated open flow, Tubb pay perforations 3,016-3,112 ft. TD 4,072 ft. Ellenburger 4,010 ft., elev. 2,452 ft.

Reagan County: Gulf Oil Corp. and Phillips Petroleum Co. 1 Shurtleff (Toyah Unit), 20-C17-PSL, 7 miles NE Toyah. IP 65,000 M.c.f. calculated open flow, shut in TP 4,600 psi., raw gas gravity 62°, pay perforations 12,570-12,610, 12,690-12,795 ft. TD 15,038 ft. Top Ellenburger 12,518 ft., elev. 2,823 ft.

Terry County: Joseph I. O'Neill Jr. 1 Cacy Day, 23-D11-C&M Sur., 13 miles NE Tokio. IPP 220.7 BOPD, 30°, GOR 200, top Glorieta pay 6,000 ft. TD 7,015 ft., elev. 3,520 ft.

Ward County: British-American Oil Producing Co. 1 Tubb, 13-B20-PSL, 14 miles SE Monahans. IP 313 BOPD, 16/64-in., TP 1,040 psi., GOR 1,610, 48.5°, pay perforations 8,236-60 ft. TD 8,390 ft. Ellenburger 8,070 ft., ground elevation 2,569 ft.

Yoakum County: Hunt Oil Co. 1 Johnson, 644-D-J. H. Gibson Sur., 9 miles SW Plains. IP 317 BOPD, ¼-in., TP 360 psi., GOR 50, 37°, Devonian perforations 11,438-75 ft. TD 11,553 ft., elev. 3,706 ft.

SOUTHEAST NEW MEXICO

Lea County: Continental Oil Co. 2 Bell Lake Unit, 20-23s-34e. IP 13,100 M.c.f., plus 140 bbl. 55.8° distillate and 70 bbl. salt water, 11/64-in., pay 12,635 ft., perforated 12,635-65 ft. TD 13,044 ft. Elev. 3,642 ft., Pennsylvanian by samples 12,603 ft.

Stanolind Oil & Gas Co. 1 Buffalo Unit, 3-19s-33e. IPP 113 BOPD, 40°, GOR 1,053, perforated 10,597-10,620 ft. TD 14,916 ft. Elev. 3,745 ft. Wolfcamp 10,580 ft.

(Continued on page 233)

This announcement is neither an offer to sell nor a solicitation of an offer to buy any of these securities. The offering is made only by the Prospectus.

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December 6, 1954

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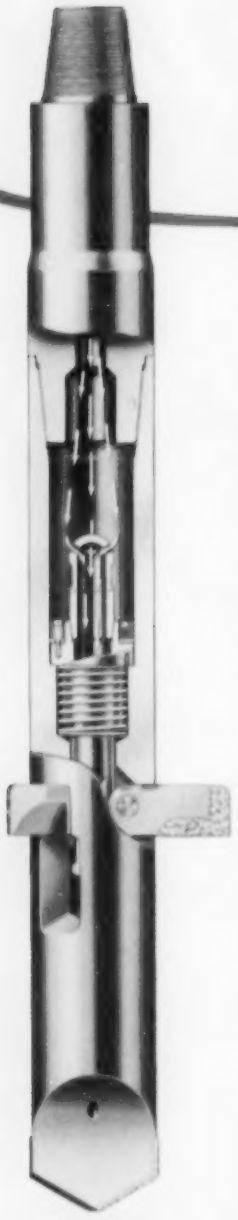

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Wall Scraper

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Jersey Standard executive started at bottom in 1934

JOHN J. WAYBRIGHT, new assistant coordinator for North American refining activities of Standard Oil Co. (N.J.), joined the big Jersey Standard organization just 20 years ago as a student engineer.

The 42-year-old executive is transferring to New York from Everett, Mass., where he has served the past 2 years as refinery manager for Esso Standard Oil Co., the parent firm's principal refining and marketing affiliate in the United States.

Waybright first went to work for Esso Standard at its old Eagle Works in Jersey City immediately after his graduation from the U. S. Naval Academy in 1934. He was graduated from the academy with honors, receiving his B. S. degree in marine engineering.

He was quickly promoted from student engineer, and later the same year was transferred to the engineering technical service division at Esso's Bayway refinery, Linden, N. J. He remained there until May, 1942, when he was called to active duty in the Navy.

Moves up . . . A series of rapid promotions followed his return to civilian status in December 1945.

He rejoined Esso as technical and economics analyst in the manufacturing department, and a year later was placed in charge of the manufacturing cost analysis group at Bayway. His next move was a promotion to cost analyst and head of technical functions of the company's economic analysis division.

In mid-1951, Waybright moved into a management position as assistant to the general superintendent at Bayway. He moved from there to Everett as refinery manager in January 1952.

Waybright takes over his new job as assistant refining coordinator the middle of this month. He plans to make his home in suburban Connecticut.

War service . . . Waybright served in the Pacific during World War II. He became flag secretary to Admiral James Kaufman, who was commander of destroyers and cruisers (Pacific).

Later, Waybright had both shore and sea duty in the Philippine area. He was awarded the Bronze Star for wartime service and was discharged from active duty as a lieutenant commander.

Waybright was born March 3, 1912 at Clarksburg, W. Va. He is married and has four children—three girls and a boy—ranging in age from 3 to 16 years.

Although still interested in naval affairs, he now exercises his sea legs mostly by digging in his garden and taking his boxer dogs for a walk. He also enjoys an occasional round of golf. For less rigorous entertainment, he plays bridge.

Luther H. White, formerly chief geologist for the McElroy Ranch Co., has resigned effective December 15 to open offices in Fort Worth as a consulting geologist. Before joining McElroy Ranch, White was with Deep Rock Oil Corp., Sunray Oil Corp., and the J. A. Hull interests, all in Tulsa, and with Sinclair Oil & Gas Co. in Fort Worth.

H. W. Weller will join Oil Trading Associates, Inc., of New York City, January 1, 1955, as a vice president Weller presently is serving as vice president and director of Esso Export Corp. He has been affiliated with Jersey Standard companies more than 25 years.

M. E. Witherspoon, formerly assistant general manager of Plymouth Oil Co., has been named acting general manager of the company, replacing W. M. Griffith, who was killed in a plane crash November 20. **Russell C. Conkling,** Midland, Tex., consulting geologist and independent operator, has been named acting chief geologist of Plymouth, replacing A. P. Loskamp, who was killed in the same crash. Conkling resigned as Plymouth's chief geologist earlier this year to devote full time to operations of Russell C. Conkling & Sons, Midland.

Daniel A. Busch has resigned as manager of exploration of Zephyr Drilling Corp. in Tulsa to open offices there as a consulting geologist.

Robert Puckett, chief station engineer for Service Pipe Line Co. at its Salt Creek Station in Midwest, Wyo., since February 1953, has retired after 34 years of service with Service.

C. C. Conger has been promoted to general foreman of the construction department by Standard Oil Co. (Ind.) at its Casper, Wyo., refinery. Conger succeeds **J. H. Arbuckle,** who has retired.

C. W. Hamilton has been named to head the new Eastern Hemisphere production offices of Gulf Oil Corp. The offices are being moved from New York to London. Hamilton has been vice president of the company in charge of foreign production since 1940. Hamilton has had 42 years' experience in foreign oil operations. He started with Gulf as chief geologist of Mexican Gulf Oil Co. in 1916.

C. F. William Gebelein has been appointed technical director of the petroleum sulfonate department of Pennsylvania Refining Co. at Butler, Pa. Gebelein had been serving as a chemist with Esso Standard Oil Co. at its Bayway, N. J. refinery.

Robert F. Herron of M. J. M. & M. Oil Co., Ventura, Calif., has been elected president of the Pacific section of the American Association of Petroleum Geologists for 1955. Other officers elected were, **Harold L. Fothergill,** Union Oil Co., Santa Maria, vice president; **Thomas S. Cate, Jr.,** Shell Oil Co., Ventura, secretary; and **Howard E. Stark,** Richfield Oil Corp., Ojai, treasurer.

George L. Bonar, assistant to the president of The Texas Co., has been named assistant to the chairman of the board. Bonar became associated with Texaco in the refining department in Tulsa in 1928. He served in various capacities in Houston and New York City before becoming assistant to the vice president in Houston in 1944. He was named assistant to the executive vice president in 1950, and 2 years later became assistant to the president. **Hanson D. Teeters,** executive assistant

in the finance and economics department has been named assistant to vice president.

David Weigle, formerly in the production department of Gulf Refining Co. at Evansville, Ind., has been transferred to McLeansboro, Ill.

William P. Fairchild has joined the staff of the Whiting, Ind., research laboratories of Standard Oil Co. (Ind.). Fairchild, a member of the American Chemical Society, was with Shell Oil Co. before joining Indiana Standard.

Edwin R. Gilliland, professor of chemical engineering at Massachusetts Institute of Technology, has been named to receive the William H. Walker award of American Institute of Chemical Engineers. Gilliland is known in the petroleum industry for his work on refining problems and for work he has done in coordination with members of Standard Oil Co. (N.J.).

Rizer Everett, who has been serving as district geologist for Carter Oil Co. at Jackson, Miss., has been appointed chief geologist for Standard-Vacuum Maatachappij in Palembang, Indonesia. He will be stationed on Sumatra.

Ralph E. Schneider has been transferred from the executive department to the light-hydrocarbon department by the Dow Texas Division of Dow Chemical Co. **Charles R. Steffler** has moved from organic basic research laboratory to succeed Schneider. **T. F. Morrey** has been transferred from the maintenance shops to organic basic research to succeed Steffler.

Charles Johnston, Inter-Mountain Chemical Co., Green River, Wyo., has been elected chairman of the Wyoming section of the American Institute of Mining and Metallurgical Engineers. Others elected are: **Earl Spieles,** Ohio Oil Co., Casper, first vice chairman; **J. C. McCarthy,** Stanolind Oil & Gas Co., Casper, second vice chairman; **Frank Kratka,** Union Pacific Railroad, Rock Springs, secretary-treasurer; and **F. M. Burback,** Mobil Producing Co., Inc., Casper, assistant vice president.

Egloff, Conant Discuss West Germany's Oil Industry

Dr. Gustav Egloff, left, director of research for Universal Oil Products, Des Plaines, Ill., has recently returned from a visit to Germany. While there he and Dr. James B. Conant, U. S. High Commissioner to Germany, discussed the comeback the German petroleum industry has made since the war. Egloff said that he was amazed at the progress the Germans had made in reconstructing their country since he was there in 1950.

Stan Hardison, former chief geologist for Kerr-McGee Oil Industries, Inc., in Midland, Tex., has been transferred to Amarillo as Panhandle district geologist for the firm.

Charles E. Hartman has been named district geologist by Cities Service Oil Co. at Billings, Mont. Hartman had been serving in the Bismarck, N. D., office. **John Klemer** will succeed him at Bismarck.

Reese H. Taylor, president of Union Oil Co. of California, has been re-elected a director of the Federal Reserve Bank of San Francisco for a 3-year term.

Henry J. Coleman has been named sales manager of the petrochemical department of Standard Oil Co. (Ohio). Coleman will headquarter at Lima, Ohio, where Sohio is building a $17,000,000 petrochemical plant next to its refinery there.

H. H. (Hank) Neel has been promoted to divisional geologist at the San Francisco offices of Tide Water Associated Oil Co. Neel will supervise all geological and geophysical operations of the western division of the company. The division is made up of California and parts of Nevada and Arizona. **F. A. Menken,** who had been serving as divisional exploration manager, has resigned to enter consulting work. **A. S. (Ike) Holston,** formerly geologist in charge of the Los Angeles Basin for Tide Water, has been transferred to Ventura where he will head the consolidated offices of Los Angeles and Ventura.

William N. Fessenden, former district geologist for Sun Oil Co. at Casper, Wyo., has been transferred to Denver as district geologist for the Denver-Julesburg basin area. **Lewis F. Wells,** former geologist in the Salt Lake City office, has been named district geologist to succeed Fessenden at Casper. **Dr. John F. Harvey,** who formerly served as a geologist in the Casper district office, has been moved to Salt Lake City as senior geologist.

H. M. Kirk, manager of Canadian operations for Tide Water Associated Oil Co., has been elected chairman of the Saskatchewan division of the Canadian Petroleum Association. Kirk succeeds **Charles C. Hay,** president of Royalite-Hi-Way, Ltd., who has been president of the Saskatchewan division since its beginning in 1952. **R. A. Cruickshank,** general manager of Canadian Devonian Petroleums, Ltd., was named vice chairman of the executive committee. Other members elected to the executive committee are: **H. W. Sroneman,** Imperial Oil, Ltd., and Hay. Other members elected to the board of directors are: **R. A. Bishop,** Sohio Petroleum Co.; **N. W. Martison,** Shell Oil

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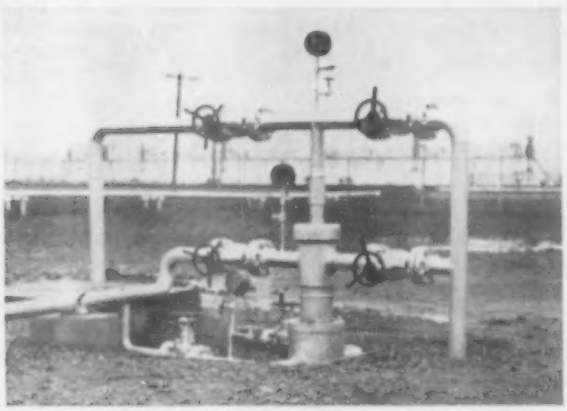
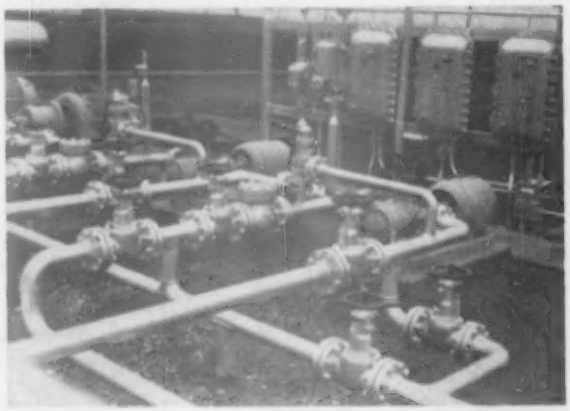
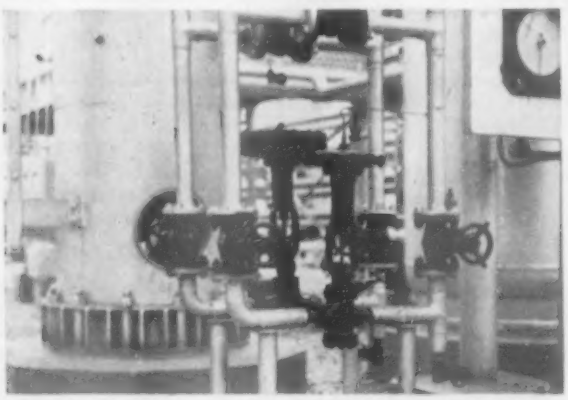


Surface installations over propane underground storage well in Kansas.



Suction and discharge propane and water lines at underground storage project in Kansas.



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PERSONALS

Co.; **C. B. Newmarch,** Standard Oil Co. of California; **W. R. Stanhope,** Socony-Vacuum of Canada, Ltd.; and **D. M. Tyerman,** MacPherson, Leslie & Tyerman.

George Reed has opened independent consulting offices at Wichita. Reed has been active in the oil industry with Nadel & Gussman in Wichita the past 4 years, and before that had served with Gulf Oil Corp. and Skelly Oil Co.

HARRINGTON

Paul J. Harrington has been promoted to general technical adviser in the refining coordination department of Standard Oil Co. (N. J.). Harrington moves to Jersey Standard from Standard Oil Development Co., a subsidiary of Jersey, where he had been serving as assistant chief engineer since 1950. Other appointments in the refining coordination department include: **A. T. Rynalski,** who has been named area adviser for refining activities of Creole Petroleum Corp. and Lago Oil & Transport Co., Ltd.; and **J. E. Woodward,** who was appointed to direct refining activities for Esso companies in the United Kingdom, France, and Ireland. Woodward succeeds **M. J. Jamieson,** who will retire in February after 35 years of service with Jersey Standard affiliates.

O. N. Knox, general superintendent of production in the Tulsa office of Carter Oil Co., has been promoted to assistant to **O. D. Harper,** production department manager. Other promotions announced by Carter include: **E. C. Wells** and **W. F. Eiting, Jr.,** to staff assistants to the production department manager; **R. C. Curtis,** production manager of the northern division at Billings, Mont., to eastern division production manager at Mattoon, Ill.; **J. Roy Dorrough,** production staff assistant in the southern division at Shreveport, to northern division production manager at Billings; **Howard C. Kuffman,** division engineer of the western division at Denver, to production staff assistant in the southern division at Shreveport; **William S. Stovall,** staff engineer at Oklahoma City's central division headquarters, to division engineer for the western division at Denver; **L. Max Lyon,** district engineer at Seminole, Okla., to central division engineering staff at Oklahoma City; and **John B. Campbell,** senior petroleum engineer, to district engineer at Seminole.

Roy C. Marion has joined Atlantic Refining Co. as a geologist at Bismarck, N. D.

Vernon J. Main, Jr., has been promoted to geologist at New Orleans with Union Oil Co. of California. Before his promotion Main was a scout with Union at Lafayette, La.

H. B. Pullar, president of Berry Asphalt Co., Magnolia, Ark., has been elected chairman of the executive committee of the Asphalt Institute for 1955. **C. E. Defabaugh,** Phillips Petroleum Co., has been named vice president of the Midwest division.

W. O. Albert, production superintendent of Kewanee Oil Co., has retired after 36 years of service with the company. Albert began his Kewanee career in 1918 as a scout in Osage County, Oklahoma. He was made assistant production superintendent in 1930 and was promoted to production superintendent in 1947.

C. Wesley Tyson and **Harold W. Scheeline** have been named to head two recently formed major divisions of

C. W. TYSON

H. W. SCHEELINE

Standard Oil Development Co. Tyson, who has been with Standard Development since 1930, has been chosen to direct the petroleum development division. Scheeline, a veteran of 15 years with the company, has been appointed chief of the chemicals development division. The new divisions were created by splitting the former development division into two parts. **Arnold F. Kaulakis** and **Henry J. Ogorzaly** have been named assistant directors of the petroleum development division. **Stanley E. Jaros** has been appointed assistant director in the chemicals development division under Scheeline.

John S. Thompson has been promoted superintendent of coordination by Sun Oil Co. at its Marcus Hook, Pa. refinery. Other promotions made by Sun at Marcus Hook include: **C. Calvin Naylor,** superintendent of operations; **A. Earle Creamer,** superintendent of blending and packaging; **W. Harlan Taylor,** assistant superintendent, blending and packaging; and **William A. Casey,** assistant to the refinery manager.

DEATHS

Frank J. Searight, 67, retired Tulsa oil producer, died December 8, at his home there. Searight had been partially paralyzed since 1951 when he suffered a cerebral hemorrhage. Searight began his activities in Tulsa in 1918 and later drilled wells in Colorado, Kansas, Texas, and Oklahoma.

James T-B. Bowles, 72, retired director, secretary and technologist of Crown Central Petroleum Corp., died recently at Baltimore, Md. Bowles served with Crown Central from 1925 until he retired in April 1954.

Julius V. Sommer, 66, former analytical chemist for the Esso Research Laboratories of Standard Oil Development Co., died recently at his home in Elizabeth, N. J., after a brief illness. Sommer held several patents on the manufacture of synthetic carbons.

S. A. L. Morgan, 69, an authority on oil and gas law, died in Amarillo, Tex., recently. Morgan had been a special attorney for The Texas Co. since 1937. He won national recognition that year when he won an antitrust case filed by the Government against the oil and gas industry.

Emery E. Westervelt, 91, pioneer Oklahoma oil man and refiner, died recently at his home in Oklahoma City. Westervelt organized the first refinery at Oklahoma City and later engaged in the oil production.

John Huegel, 63, vice president of Bodie-Hoover Petroleum Corp., died recently in Chicago.

William Jap Boyd, 50, area material supervisor for Gulf Oil Corp. at Kiefer, Okla., died recently at his home in Kiefer.

Albert M. Berlander, 69, veteran pipeline superintendent of Bechtel Corp., died recently at Port Arthur, Ont., where he was serving as a consultant on construction of the Trans-Canada Pipe Lines system.

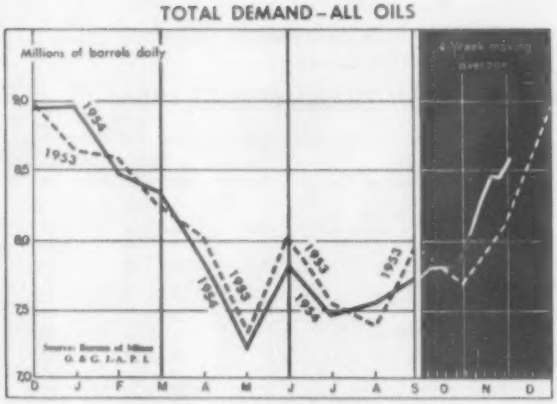
Harry O. Heller, advertising manager of Reed Roller Bit Co., died recently at his home in Houston. Heller had been head of the advertising department at Reed for 20 years.

Latest Figures . . . Industry Trends

A QUICK LOOK AT THE HIGHLIGHTS

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,319,325	UP	46,500	UP	118,359
Crude stocks	267,869,000	DOWN	1,810,000	DOWN	14,704,000
Completions	1,013	DOWN	9	UP	65
Refinery runs	6,962,000	DOWN	12,000	DOWN	2,000
Gasoline stocks	151,378,000	UP	2,187,000	UP	3,417,000
Four-product stocks	372,595,000	DOWN	3,269,000	UP	9,580,000
Total imports	1,191,500	UP	141,100	UP	278,000

TOTAL DEMAND – ALL OILS



Crude Stocks Are Operating Factor But Not Controlling in Markets

HOW much significance marketwise should be attached to the steady decrease in crude-oil inventories since late summer with present stocks about 15,000,000 bbl. under a year ago?

Though opinions vary, the quick answer of many market students is that while the decline represents a favorable statistical development in this period of excesses it is not of controlling significance in present market trends for either crude oil or products.

Veteran marketers, going back to the twenties and earlier, can recall conditions in which both crude oil and product prices moved up and down with the decreases and increases in crude-oil stocks. When uncontrolled operations from new fields brought greater supplies the excesses went to steel and other aboveground storage. As the supplies from the flush fields declined there were withdrawals from storage and prices stiffened. The objective of the crude buyers was "to buy low and sell high" with trends in products quotations closely paralleling the ups and downs of the crude market.

The application of proration and other conservation regulations and the greater knowledge of underground reservoir conditions brought changes in this situation starting in the early thirties. Crude-oil buyers from the small refiners to the large crude-buying agencies came to realize that there were few or no profits and often losses in storage programs resulting in the conclusion that the place to store crude oil was in the ground.

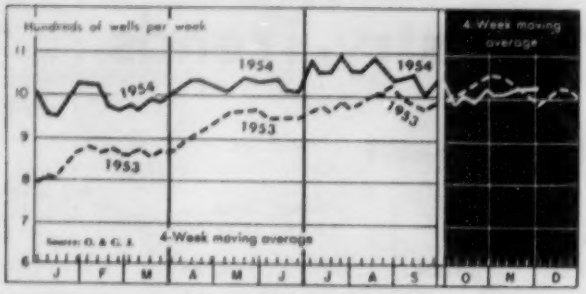
The buyers, despite increasing demands starting in the early thirties, began a program of reducing aboveground stocks and a great amount of steel storage was junked. At the end of 1938, stocks of refinable crude totaled 274,958,000 bbl. in this country. Although the total demands for petroleum have increased 117 per cent since that date, crude-oil stocks on November 20 of this year were only 269,679,000 bbl. Based on days' supply the stocks at the end of 1938 represented 75 days' supply while those on November 20 were about 33 days' supply.

The point here is that proved crude-oil reserves and not changes of crude-oil stocks aboveground have become the measure of available raw material in petroleum operations and have a direct bearing on market conditions. Excess reserves, just as formerly excess storage, tend to weaken markets.

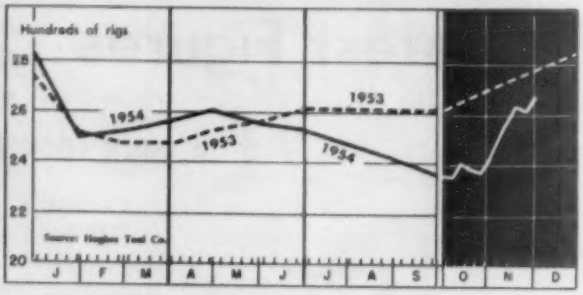
One of the measures of this situation is the crude availability in excess of current needs. That is now estimated to be 1,750,000 bbl. daily in excess of the MER. This has brought enforced and voluntary curtailments in several states so that many areas are now producing approximately 50 per cent of the MER. The constant pressure to produce in this situation is not favorable from the standpoint of strong crude-oil and refining markets.

The variations in crude-oil inventories when studied along with the seasonal changes in product inventories do have value to the industry and to the state proration bodies in determining crude-oil production allowable and crude runs to stills. Obviously, however, these crude stocks are now an operating detail and the major and long-range controls affecting market trends come from developments in proved reserves and their availability to current operations.

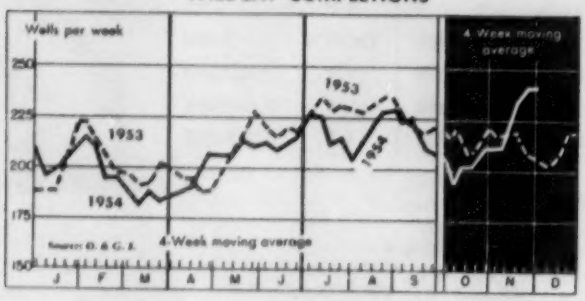
TOTAL COMPLETIONS



ROTARY RIGS OPERATING IN UNITED STATES.



WILDCAT COMPLETIONS



ACTIVE ROTARY RIGS

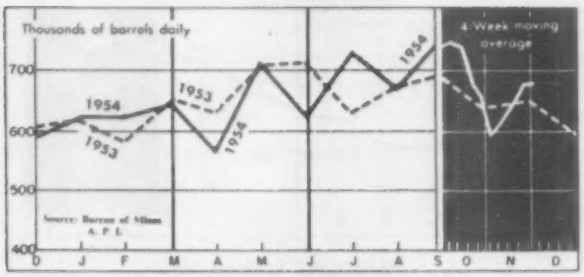
Area—	12-6-54	Change from 11-29-54	Change from 12-7-53
Gulf Coast	565	21	— 35
N. and W. Texas-New Mexico	851	36	— 29
Arkansas-N. Louisiana-E. Texas	192	5	— 22
Oklahoma	325	— 4	— 57
Kansas-S. Nebraska	190	6	22
Illinois-Eastern	150		— 15
Rocky Mountain	262	— 1	— 28
Pacific Coast	143	3	— 44
Total United States	2,678	66	—208
Western Canada	212	20	54

WEEKLY WELL COMPLETIONS . . . WEEK ENDED DECEMBER 4, 1954

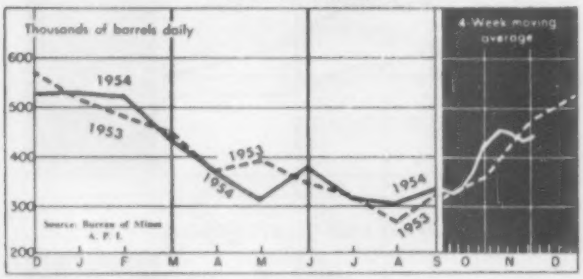
	Total of all wells					Cum.		Wildcat completions and discoveries					Cumulative total, 1954				
	Comp.	Oil	Gas	Dry	Footage	1954	1953	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
Ala-Ga.-Fla.	1	0	0	1	2,160	96	134	0	0	0	1	1	2	0	2	83	87
Arkansas	20	10	0	10	64,732	596	537	0	0	0	5	5	23	0	4	113	140
California	51	44	0	7	250,811	2,187	2,371	0	0	0	6	6	55	1	13	477	546
Colorado	18	10	1	7	101,819	1,222	678	2	0	0	9	11	35	0	17	516	568
Illinois	72	38	0	34	181,679	2,889	1,996	1	0	0	11	12	25	0	1	404	430
Indiana	21	5	0	16	31,402	796	1,233	0	0	0	6	6	9	0	1	193	203
Kansas	87	51	6	30	311,602	4,256	4,483	5	0	1	9	15	118	0	33	567	718
Kentucky	25	6	4	15	57,560	1,080	1,084	1	0	0	5	6	18	0	4	128	150
Louisiana	70	42	4	24	501,982	3,269	2,685	1	0	2	10	13	96	51	43	341	531
North	33	20	1	12	121,804	1,801	1,211	0	0	1	4	5	17	3	16	152	188
South	37	22	3	12	380,178	1,468	1,474	1	0	1	6	8	79	48	27	189	343
Michigan	11	3	1	7	30,308	527	582	0	0	0	5	5	15	0	0	198	213
Mississippi	15	5	0	10	112,211	401	374	0	0	0	6	6	10	1	0	150	161
Montana	3	1	0	2	14,296	313	416	0	0	0	2	2	6	0	2	106	114
Nebraska	10	4	2	4	54,436	401	299	0	0	0	1	1	23	0	3	125	151
New Mexico	20	9	8	3	105,824	1,015	1,347	2	0	0	1	3	22	3	20	99	144
Northwest	6	0	6	0	22,857	345	592	0	0	0	0	0	4	0	18	43	65
Southeast	14	9	2	3	82,967	670	755	2	0	0	1	3	18	3	2	56	79
North Dakota	7	4	0	3	53,565	284	246	0	0	0	1	1	5	0	0	104	109
Ohio	27	7	8	*12	62,319	1,084	1,030	0	0	0	0	0	3	0	5	14	22
Oklahoma	120	77	8	35	394,405	8,205	7,001	1	0	0	11	12	121	7	23	621	772
Pennsylvania-New York	27	9	8	†10	47,182	2,055	2,103	0	0	0	1	1	0	0	7	36	43
Texas	365	230	15	120	1,489,944	17,176	15,942	21	1	4	74	100	723	66	155	3,848	4,792
Southwest (1 & 4)	54	29	2	23	207,903	2,408	2,572	1	1	2	18	22	100	26	42	668	836
Gulf Coast (2 & 3)	46	26	2	18	276,453	2,452	2,353	2	0	0	8	10	76	32	44	618	770
East (5 & 6)	15	7	2	6	72,927	922	747	0	0	0	5	5	17	0	14	271	302
North Central (7-B & 9)	129	72	1	56	378,626	6,513	6,050	11	0	0	33	44	335	4	22	1,565	1,926
West (7-C & 8)	104	86	2	16	498,108	3,987	3,507	7	0	2	10	19	189	1	24	651	865
Panhandle (10)	17	10	6	1	55,927	894	713	0	0	0	0	0	6	3	9	75	93
Utah	0	0	0	0	0	77	64	0	0	0	0	0	3	0	1	48	52
West Virginia	12	3	8	1	25,901	568	551	0	0	0	0	0	0	0	32	16	48
Wyoming	31	18	2	11	141,289	1,159	797	0	0	0	4	4	36	0	7	185	228
Miscellaneous	0	0	0	0	0	114	73	0	0	0	0	0	3	0	1	36	40
Total United States	1,013	576	75	362	4,035,427	49,770	46,026‡	34	1	7	168	210	1,351	129	374	8,408	10,262
Total Previous Week	1,022	540	69	413	4,115,211			20	3	8	196	277	1,317	128	367	8,240	10,052
TOTAL December 5, 1953	948	465	55	428	3,716,225			22	2	3	195	222	1,331	101	336	8,538	10,306

Service Wells Included *3, †7, ‡Revised.

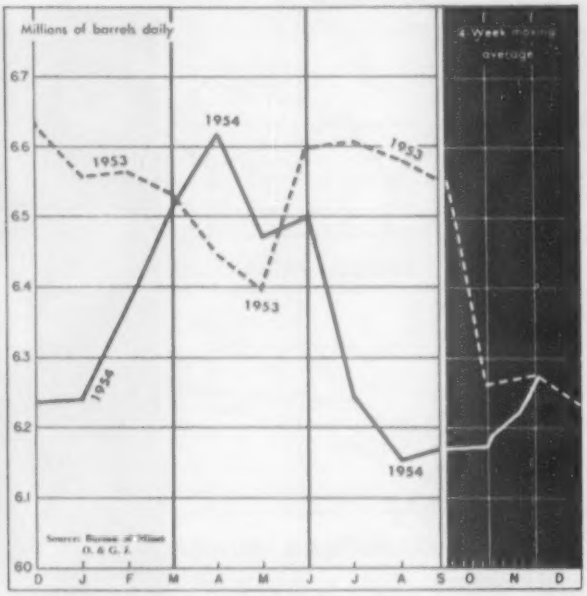
CRUDE IMPORTS



PRODUCT IMPORTS



CRUDE-OIL PRODUCTION

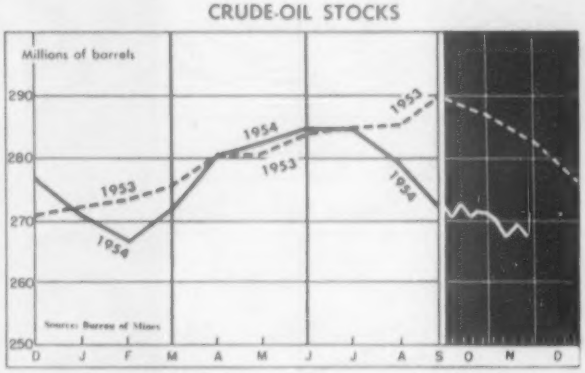


DAILY AVERAGE PRODUCTION FOR WEEK

	December 4			Nov. 27
	Crude oil	Lease condensate	Total	total
Alabama	4,000		4,000	4,000
Arkansas	72,350	500	72,850	75,600
California	960,000		960,000	960,800
Colorado	142,800		142,800	141,600
Eastern	49,800		49,800	49,800
Florida	1,400		1,400	1,500
Illinois	190,900		190,900	188,400
Indiana	29,000		29,900	29,200
Kansas	318,100		318,100	325,000
Kentucky	39,300		39,300	39,400
Louisiana	593,775	43,900	637,675	631,600
North	102,050	2,900	104,950	104,600
South	491,725	41,000	532,725	527,000
Michigan	33,400		33,400	32,500
Mississippi	89,225	3,900	93,125	92,750
Montana	39,900		39,900	38,700
Nebraska	21,600		21,600	20,500
New Mexico	210,175	2,500	212,675	211,300
North Dakota	19,100		19,100	17,900
Oklahoma	475,200		475,200	506,100
Texas	2,670,525	50,375	2,720,900	2,648,675
Dist. 1	44,725	450	45,175	43,450
Dist. 2	175,350	7,700	183,050	140,700
Dist. 3	412,925	23,750	436,675	432,550
Dist. 4	231,425	5,650	237,075	233,650
Dist. 5	43,000	475	43,475	43,475
Dist. 6	112,150	5,025	117,175	114,725
East Texas field	213,700		213,700	210,500
Dist. 7-B	129,275	25	129,300	129,025
Dist. 7-C	173,700	4,600	178,300	176,600
Dist. 8	859,425	2,025	861,450	850,025
Dist. 9	190,850	625	191,475	189,925
Dist. 10	84,000	50	84,050	84,050
Utah	4,500		4,500	4,000
Wyoming	251,800		251,800	253,300
Others	‡400		‡400	200
Total U. S.	6,218,150	101,175	**6,319,325**	6,272,825
Change from previous week, up			**46,500**	
Canada	†251,100		†251,100	†283,700
Total U. S. production January 1-December 4			2,138,407,975 bbl.	
Same period last year (crude plus cond.)			*2,191,027,051 bbl.	

*Includes 30,653,975 bbl. condensate. †Week ended previous Monday. ‡S. D. 200, Nev. 200.

CRUDE-OIL STOCKS



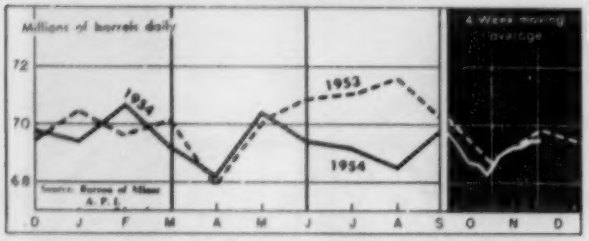
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

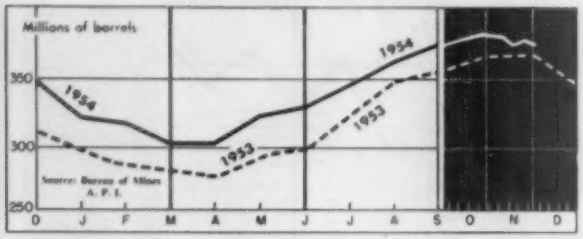
	Nov. 27, '54	Nov. 20, '54	Nov. 28, '53
Pennsylvania Grade	3,130	3,166	2,746
Other Appalachian	1,857	1,930	1,800
Illinois, Indiana, Michigan	12,584	12,411	12,508
Nebraska, N. Dakota	1,855	2,073	(‡)
Kansas	8,244	8,561	8,872
Oklahoma	26,103	26,608	28,740
Arkansas	3,039	3,031	3,344
Louisiana	15,343	15,646	17,869
North	2,276	2,416	3,207
South	13,067	13,230	14,662
Mississippi	3,105	3,195	3,396
New Mexico	8,348	8,038	8,634
Texas	121,761	122,582	132,264
East Texas proper	9,786	10,387	12,264
West Texas	54,052	55,929	57,295
Texas Gulf	24,292	23,431	28,099
Other Texas	33,631	32,835	34,606
Wyoming	13,327	13,321	13,829
Other Rocky Mountain	6,251	6,135	2,985
California	31,257	31,317	33,779
†Foreign	11,665	11,665	11,807
Total	267,869	269,679	282,573

*Bureau of Mines. †Includes 3,126,000 bbl. in California. ‡Included with Kansas.

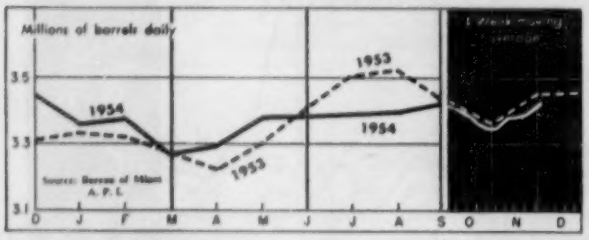
REFINERY RUNS



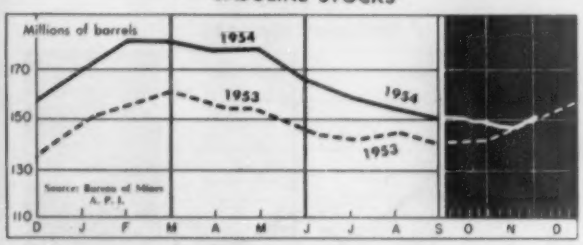
FOUR-PRODUCT STOCKS



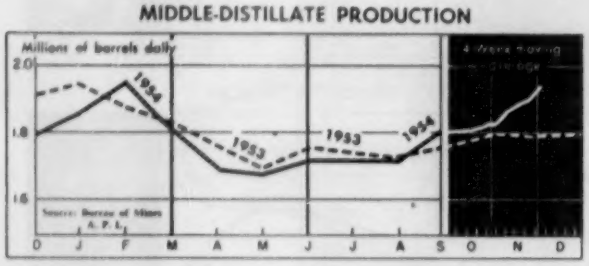
GASOLINE PRODUCTION



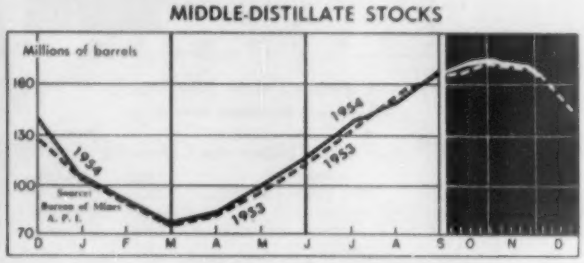
GASOLINE STOCKS



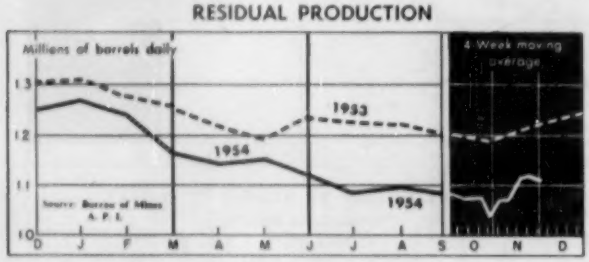
MIDDLE-DISTILLATE PRODUCTION



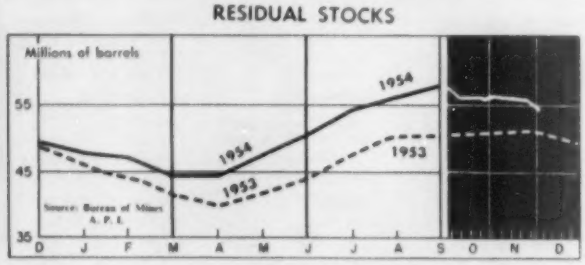
MIDDLE-DISTILLATE STOCKS



RESIDUAL PRODUCTION



RESIDUAL STOCKS



A.P.I. REFINERY REPORT, DECEMBER 3

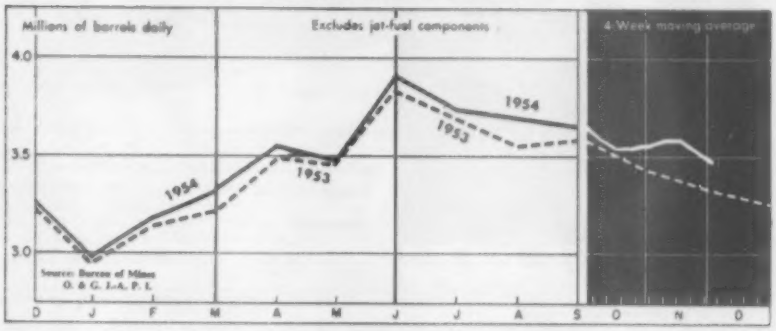
(Excludes all jet-fuel components)

(Thousands of barrels)

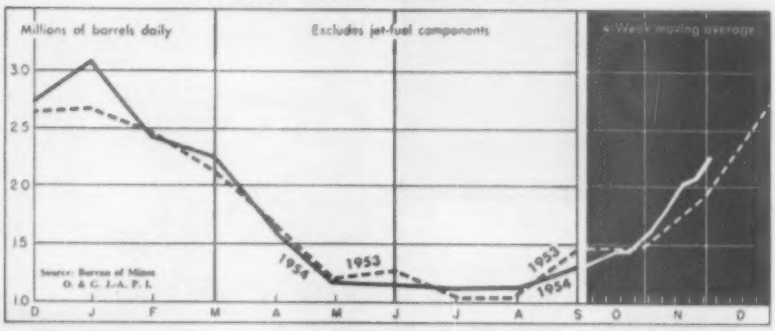
District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, December 1953 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,068	431.8	27.0	314.8	216.4	33,473	13,983	49,316	9,633	1,018	446.4	44.3	232.9	227.1
Appalachian:														
District 1	103	47.7	7.9	19.0	6.3	4,439	586	2,588	568	118	50.6	6.0	25.7	13.1
District 2	81	38.7	6.4	15.4	8.1	2,315	591	797	281	81	44.7	5.7	15.7	11.1
Ind., Ill., Ky.	1,211	672.4	75.3	248.6	161.1	31,378	9,261	24,650	4,075	1,314	719.6	86.6	233.2	199.5
Okla., Kans., Mo.	613	344.7	12.6	162.3	41.3	13,744	2,325	12,580	1,406	572	353.4	11.1	124.3	48.7
Inland Texas	238	174.4	9.4	45.4	28.3	5,582	377	2,434	1,352	240	179.8	13.6	36.7	29.0
Texas Gulf Coast	1,799	864.7	147.3	416.9	213.9	22,348	3,885	16,677	5,081	1,655	812.3	128.7	399.2	243.6
La. Gulf Coast	584	319.6	64.7	141.1	37.1	10,684	3,073	4,882	1,343	549	288.9	60.7	134.3	50.2
N. La. and Ark.	74	36.1	6.2	19.3	5.6	3,872	704	1,841	138	83	35.6	10.3	19.3	7.0
Rocky Mountain:														
New Mexico	19	10.7	...	3.6	2.7	190	...	87	37	16	10.3	1.0	2.0	3.1
Other Rocky Mt.	239	109.0	4.7	56.0	32.9	5,283	282	2,160	726	244	123.0	4.2	55.8	41.4
California	933	437.3	3.4	155.7	325.6	18,070	363	13,420	29,715	1,074	464.4	5.4	161.6	373.0
December 3, 1954	6,962	3,487.1	364.9	1,598.1	1,079.3	151,378	35,430	131,432	54,355	6,964	3,529.0	377.6	1,440.7	1,246.8
November 26, 1954	6,974	3,447.1	359.0	1,555.4	1,094.4	149,191	36,244	134,916	55,513					
December 5, 1953	6,964	3,474.1	363.9	1,369.9	1,232.6	147,961	34,217	129,764	51,073					

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

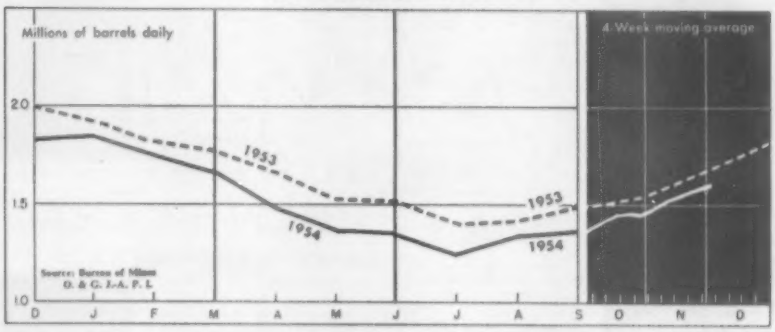
TOTAL GASOLINE DEMAND



TOTAL MIDDLE-DISTILLATE DEMAND



TOTAL RESIDUAL DEMAND



REPRESENTATIVE QUOTATIONS

Spot-market quotations of leading suppliers as of December 8, 1954. Prices are in cents per gallon, except for residual in dollars per barrel and wax in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline	10.25-11	11.25-12	10.50-10.75
Premium gasoline	11.25-12	13-13.75	11.50-11.75
42-44 w.w. kerosine	9.125-9.25	10.1-10.7	9.25-9.5
No. 2 straw fuel oil	8.375-8.5	9.35-9.95	8.75
No. 6 residual	$1.35-1.45	$2.25-2.35	$1.85-1.95

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5.5	5.0	5.25
Grade 18-55	6.6	6.1	6.35

LUBRICATING OILS
Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	18
200 vis., No. 3 neutral, 0-10 pp.	13.25

WAX
Mid-Continent

132-134 A.M.P.	6.0

• Advances ranging from 0.125 to 0.6 cent per gallon in distillate and kerosine prices became effective in Gulf Coast and Atlantic seaboard areas. Heavier fuels also advanced by some buyers on East Coast. Better demand and higher tanker rates explain advances. Gasoline stronger in Mid-Continent.

PRODUCTION AND DEMAND—MAJOR PRODUCTS

(Thousands of barrels daily)

	Refinery prod.	Total demand
Gasoline:		
Four weeks ended 12-3-54	3,437	3,474
September 1954	3,511	3,586
November 1953	3,444	3,330
December 1953	3,453	3,253
Middle distillate:		
Four weeks ended 12-3-54	1,941	2,262
September 1954	1,815	1,415
November 1953	1,785	1,926
December 1953	1,794	2,707
Residual fuel:		
Four weeks ended 12-3-54	1,111	1,615
September 1954	1,086	1,368
November 1953	1,223	1,654
December 1953	1,247	1,809

SUPPLY AND DEMAND*

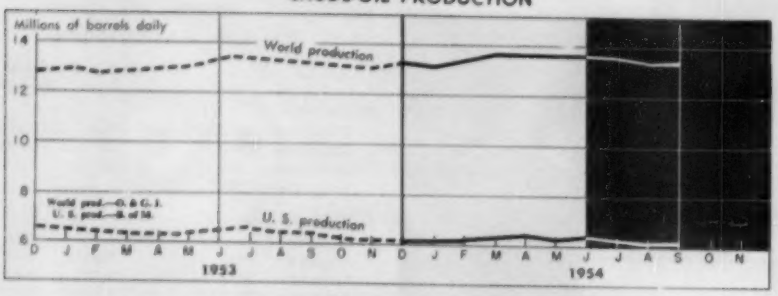
(Thousands of barrels daily)

	Sept. 1954	Sept. 1953
Domestic demand	7,491	7,530
Gasoline	3,490	3,465
Kerosine	219	237
Distillate	1,131	1,142
Residual	1,302	1,423
Jet fuel	144	104
Lubricants	110	119
L.P.G.	306	320
Other products	726	695
Crude loss	63	25
Exports	304	377
Gasoline	96	115
Kerosine	10	18
Distillate	55	72
Residual	66	75
Jet fuel		4
Lubricants	34	33
L.P.G.	10	8
Other products	16	15
Crude	17	37
Total demand	7,795	7,907
Gasoline	3,586	3,580
Kerosine	229	255
Distillate	1,186	1,214
Residual	1,368	1,498
Jet fuel	144	108
Lubricants	144	152
L.P.G.	316	328
Other products	742	710
Crude exp. and loss	80	62
Stock change	32	339
Crude	—214	142
Products	246	197
New supply	7,827	8,246
Imports	998	1,014
Crude	672	692
Products	326	322
Production	6,829	7,232
Crude	6,151	6,557
Natural gasoline, etc.	678	675
Runs to stills	6,939	7,023

*Bureau of Mines

(The schedule of selected crude prices appeared on page 204 of the December 6 issue and will be printed again next week.)

CRUDE-OIL PRODUCTION

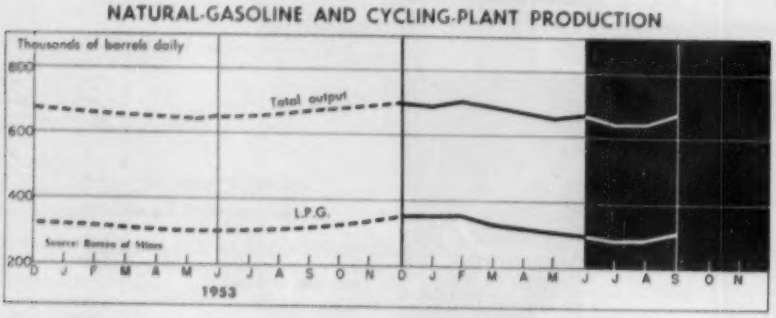


CRUDE PRODUCTION

(Thousands of barrels daily)

Month—	U. S.	World
September 1954	6,151	13,389
August 1954	6,168	13,428
July 1954	6,259	13,528
January 1954	6,240	13,168
September 1953	6,557	13,161

NATURAL-GASOLINE AND CYCLING-PLANT PRODUCTION

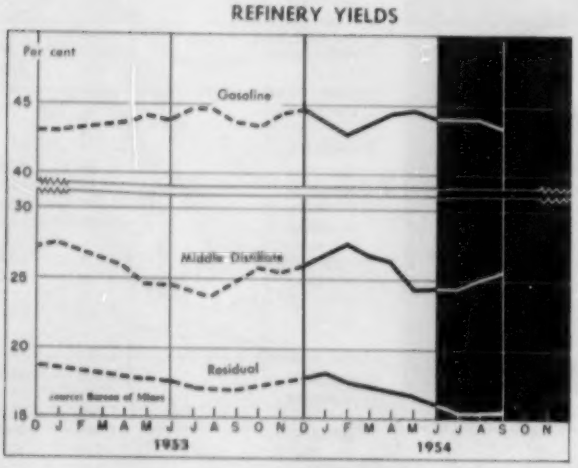


PRODUCTION AT NATURAL-GASOLINE AND CYCLING PLANTS

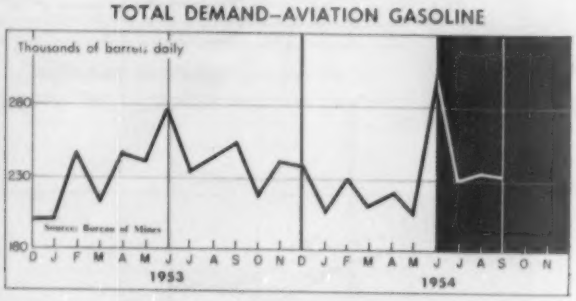
(Thousands of barrels daily)

Month—	L.P.G.	Total
September 1954	315	676
August 1954	289	642
July 1954	286	642
January 1954	355	688
September 1953	317	674

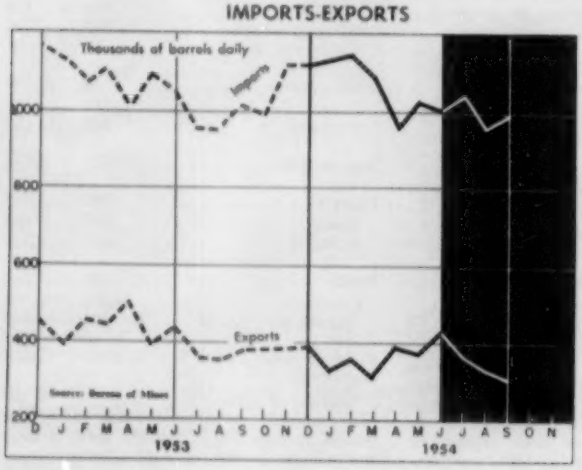
REFINERY YIELDS



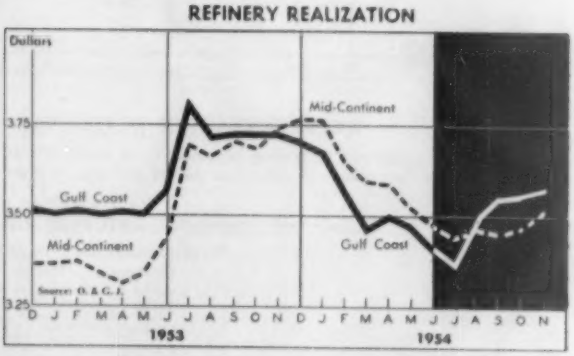
TOTAL DEMAND—AVIATION GASOLINE



IMPORTS-EXPORTS



REFINERY REALIZATION



REFINERY REALIZATION

	Nov.* 1954	Oct.* 1954	Sept. 1954	Nov. 1953
Mid-Continent	$3.52	$3.47	$3.45	$3.74
Gulf Coast	3.58	3.56	3.53	3.73

*Preliminary.

Refinery realization is based on yields of major products and average spot prices of regular gasoline, kerosine, No. 2 fuel, and residual as published in The Oil and Gas Journal.

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FOR SALE EQUIPMENT

1—MODEL RL 3-Drum Cardwell Powered with Buda Model 844D Diesel Engine. Rig and Engine in Perfect Condition. 1-87' 2-Pole Mast. Box H-404, The Oil and Gas Journal, Tulsa, Oklahoma.

5—C96 CONTINENTAL Engines, complete, and 1—Fairbanks-Morse ZC-346 Engine, complete. These engines purchased new in 1952, and are reconditioned and guaranteed. Priced to sell. Price on request. H. & H. Supply Co., Box 4173, Oklahoma City, Oklahoma.

SALES and rentals of cable drilling and fishing tools, casing and equipment, from the Southwest's largest stock of used cable tools and oil field supplies. Degen Pipe and Supply Co., Tulsa, Oklahoma.

WILSON ATLAS—Bargain price; 2-LI-600 Cummins in good condition; enclosed oil-bath compound: includes one American and one plain cathead, one 1000 Gal. full tank. Call Madison 1923, Houston or Amherst 73311, Wichita or write P. O. Box 2001, Wichita, Kansas.

Gaso Duplex 4½" x 6" Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

GASOLINE PLANT *FOR SALE*

Gasoline Plant, located in Brazoria County, Texas, shut down in January, 1954. Had been processing approximately thirty-three million feet of gas daily with absorber pressure approximately six hundred thirty pounds. Plant recovered Propane, Butane, Gasoline, Kerosene and Diesel Oil. Adequate storage tanks for all products. Drum Lead Blending Plant. Detailed inventory available upon request.

SOUTHERN PRODUCTION CO., INC.
P. O. Box 670, Ft. Worth, Texas

USED EQUIPMENT

Franks model 2000 Core Drill double drum drawworks; 48 ft. derrick; 5 x 8 pump; table, swivel, kelly, elevator, elevator links; mounted on 1946 International truck.

Franks SAL 4500 Skid Rotary Rig Cummins Power, 96' Derrick. Located, Tulsa, Oklahoma. O.C.S. Type 5 Servicing Unit mounted on 1942 Mack Truck. Located Odessa, Texas.

Write, Wire or Call

FRANKS MFG. CORPORATION
BOX 3218, WHITTIER STATION
TULSA, OKLAHOMA

FOR SALE EQUIPMENT

FOR SALE: Sullivan 200 complete with all tools ready to work. Located Tulsa, Okla. Contact R. F. Mesker, Phone 6-0037 or 5-9357, Tulsa.

FOR SALE: Wilson Titan—20" Gardner-Denver pump, 14" Gardner-Denver pump, 200-ton derrick equipment, Cameron Blow-out preventor, 10,500' 4½" drill pipe. Can be seen operating on location in Oklahoma. Write Box H-529, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE: 1954 Cessna, 195, equipped w/ Lear Exec. ADF, VHF, LF Marker Beacon. Dual landing lights, cross wind gear. Less than 80 hrs. total time. This plane offered for sale due to purchase of Twin Beech. Herley Supply Co., 3040 Cherry Avenue, Long Beach 7, Calif. Phone L.B. 41687 or Nevada 62087.

GASOLINE AND CYCLING PLANT EQUIPMENT FOR SALE

Located in La Rosa Field, five miles south of Woodsboro, Texas, on Farm Road 1360. Plant shutdown in June, 1954. Bid sheets and inventory available upon request.

STANOLIND OIL AND GAS COMPANY
P. O. Drawer 1990
CORPUS CHRISTI, TEXAS

FOR SALE EQUIPMENT

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SUPERIOR OIL CO. holds ⅓ of this mineral lease, will lease the other ⅔ interest, 64.4 acres undivided net of 96.6 tract, Young County, Texas. About 6 miles N.E. Eliasville. For 3 year lease, $100.00 per acre, OK as approved by attorney. Lessee to pay title check. Inquiries, P. O. Box 722, Clifton, Arizona.

SEE A. L. BOWLES, Box 947, Ada, Okla., for drilling deals and producing royalties if you have the cash for Oil Investments.

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Exploration Highlights

TEXAS GULF COAST

(Continued from page 214)

Atlantic Refining Co.'s discovery well, productive of gas-condensate, and opening East Aransas Pass field, was completed in a Marginulina sand with perforations at 7,014-22 ft. and 7,032-36 ft. The discoveries are from 2 to 2½ miles northeast of Aransas Pass field.

Three other tests are drilling in the area, two by Atlantic Refining Co. and one by F. William Carr, of Corpus Christi. Two additional tests are projected by Emory M. Spencer, of Rockport.

Deeper Oil Reservoir Opened in Midway Area

Republic Natural Gas Co. is opening a new oil-producing reservoir in a deep test, its 1 McCarty, located 500 ft. south of production in Midway field, 3 miles west of Gregory, in San Patricio County. Production in Midway field is from shallower horizons.

Production in the new discovery, in a sand with perforated interval at 8,741-51 ft., was at the rate of 220 bbl. of 43.5°-gravity oil per day through 9/64-in. choke. Pressure was 1,600 psi. and gas-oil ratio 1,055 to 1.

New Live Oak Discovery

Discovery of a new producing area, 1½ miles northeast of Cornelia, in Live Oak County, has been made by Houston Oil Co. and Ellis B. Colvin. Discovery well, 1 Brown, in Patrick Nevin Survey, flowed 36.7 bbl. of oil with 63 bbl. of water per day through ⅝-in. choke. Pressure was 125 to 150 psi. Pay is from sand interval at 3,387-93 ft.

SOUTH LOUISIANA

Second Live Oak Well Adds Two New Pay Zones

Houston Oil Co. has added two new pay zones in its Live Oak field, southern Vermilion Parish. These zones, one perforated at 12,238-46 ft. and the other at 12,490-95 ft., both productive of gas and condensate, augment the oil-producing zone in which the discovery well was completed with perforations at 12,334-40 ft.

The new zones were opened by the company's 3 Godchaux, ¾ mile south of the discovery well, 1 Godchaux, completed early this year, and until now the only producer. The company's second test, 2 Godchaux, ½ mile east of the discovery well, was abandoned temporarily when operators were unsuccessful in attempts to recover stuck drill-pipe after a strong gas flow.

The new well is completed dually, flowing at the rate of 75.7 bbl. of 45.9°-gravity condensate, with 4,560,000 cu. ft. of gas per day through 14/64-in. choke from the lower zone, and 78.5 bbl. of 46.6°-gravity condensate with 4,480,000 cu. ft. of gas per day, also through 14/64-in. choke, from the upper zone. Flowing pressures from the two zones were 4,167 psi. and 4,135 psi., respectively.

Potential of the discovery well was 374 bbl. of 34.1°-gravity oil per day 10/64-in. choke. It had a gas-oil ratio of only 960 cu. ft. per barrel. Flowing pressure gaged 2,000 psi.

New Producer Confirms Extension at Raceland

Stanolind Oil & Gas Co. has completed its second well in its new extension area a mile west of Raceland field, 3 miles east of Raceland, in Lafourche Parish.

Its 1-C South Coast, ½ mile south of the initial extension well, 1-B South Coast, flowed at the rate of 35 bbl. of 48°-gravity condensate and 1,600,000 cu. ft. of gas daily through 9/64-in. choke.

Production is from a middle Miocene sand, topped at 10,843 ft. Hole was drilled at 11,025 ft. and plugged back to 10,910 ft.

Stanolind is attempting another major extension at Raceland where its 1-A Godchaux, 1½ miles north of the two west extension wells, has run casing to 13,392 ft. to test.

New Offshore Production Found in Main Pass Area

A new oil field has been uncovered in the Gulf of Mexico off the east coast of lower Plaquemines Parish. Discovery well, 1 State Lease 2557, in Block 67, Main Pass area, drilled by California Co., flowed 120 bbl. of 36°-gravity oil per day through ⅛-in. choke from sand interval at 6,875-80 ft. Flow was under pressure of 2,175 psi. with gas-oil ratio of 4,248 cu. ft. per barrel. Total depth was 8,011 ft. Location is several miles east of Block 69 field.

Third Pay Zone Produces In Crab Lake Discovery

The multiple-pay Crab Lake field, in southern Cameron Parish, got its third producing zone with completion by Forest Oil Corp. of its 5 Miller, north outpost test, flowing 30 bbl. of 37.5°-gravity oil and 2,290,000 cu. ft. of gas per day through 5/32-in. choke from sand at 11,865-80 ft.

The well is the third successful completion in the field, opened early this year. The initial test, 1 Miller, blew out while drilling at 13,330 ft., and cratered, resulting in abandonment. The second test, 2 Miller, 2,250 ft. to the west, was completed as a gas-condensate well in sand at 9,918-25-ft. The third test, 3 Miller, southeast of the blow-out well, produced oil from sand at 12,576-86 ft. No. 4, a mile east of the discovery well, was a failure at 12,696 ft.

Deep Gas Pay Confirmed At Queen Bess Island

Gas-condensate production discovered last July in a 15,450-ft. sand at Queen Bess Island field, in the coastal marshes of Jefferson Parish, has been confirmed with a ¾-mile southeastward extension.

The confirmation extension well, is The Texas Co. 13 State-Barataria Bay, now shut in pending potential tests. It flowed an ungaged volume of gas and condensate while cleaning. Productive interval is 15,454-81 ft. with bottom of hole at 16,529 ft.

The sand's discovery well, 12 State, flowed at the rate of 123 bbl. of 44°-gravity condensate and 9,130,000 cu. ft. of gas per day through 3/16-in. choke from interval at 15,454-81 ft.

ROCKY MOUNTAIN

(Continued from page 215)

1,100 bbl. per day on initial tests of Paradox (Pennsylvanian). Production is through perforations at 5,244-72, 5,294-5,306 and 5,316-20. The discovery, the first commercial oil producer in the southeastern portion of the state is 15 miles southeast of Bluff.

NORTH DAKOTA

Bottineau County Producer Testing

Cardinal Drilling Co. and Deep Rock Oil Corp. have reported a flow of 9 bbl. of oil per hour at 1 Clarke, NE NE SE 35-164n-80w, in North Westhope field, Bottineau County. The gage is the best reported to date in the three-well field. Production is from Charles at 3,227-37 ft. Flow was through ¼-in. choke with tubing pressure of 270 psi. Earlier completions in this area have generally produced some water with the oil.

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Successful Wildcats

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ILLINOIS

Coles County: H. C. Sanders 1 Parker, SW NW NE 25-14n-7e. IPP 54 BOPD, Rosiclare 1,782-89 ft., 35.9°. TD 1,790 ft. (Opens North Humbold pool.)

KENTUCKY

McLean County: J. C. Miller-Ashland Oil & Refining Co. 1 Phillips, SE SW SE 23-O-26. IPP 40 BOPD, Painted Creek sand 2,070-90 ft. TD 2,448 ft. (New pay in Elba field.)

SOUTH LOUISIANA

Calcasieu Parish: W. T. Burton 1 Lawton et al, 27-10s-11w. IP 45.24 BOPD, 6/64-in., 49°, perforations 9,383-93 ft. TD 9,950 ft. (New field.)

Vermilion Parish: Houston Oil Co. of Texas 3 Godchaux et al, 88-14s-3e. Shut-in gas well, no gage, perforations 12,230-46 ft., 12,321-57 ft., and 12,490-95 ft. TD 13,145 ft. (New pay in Live Oak field.)

OKLAHOMA

Oklahoma County: C. H. Nicholson 1 Doster "A," SE SE SE 28-14n-1e. IPP 35 BOPD, lower Skinner 5,084-91 ft. TD 5,114 ft. (Oil discovery.)

KANSAS

Barber County: M. B. Armer 1 Fitzgerald, SE SE SE 7-33s-11w. IP 10,900 M.c.f. of gas per day, Douglas 3,648-56 ft. TD 4,500 ft. (Gas discovery.)

Edwards County: Gramehart-Miller Oil Co. 1 Sturgeon, SE SE NW 33-26s-18w. IPP 30 BOPD, Viola 4,721-26 ft. TD 4,920 ft. (Opens Sturgeon pool.)

Graham County: Empire Drilling Co. 1 Keith, SW SW SW 3-9s-24w. IPF 1,736 BOPD, Lansing 3,900-06 ft. TD 3,985 ft. (Opens Holley pool.)

Petroleum, Inc. 1 McCall "B," NE NE SW 25-10s-23w. IPF 300 BOPD, Lansing 3,596-3,600 ft. TD 4,145 ft. (Opens Prairie Glen pool.)

Pratt County: Anschutz Drilling Co. 1 Tatlock, NE NE NW 28-26s-15w. IPF 455 BOPD, Lansing 3,925-29 ft. TD 4,700 ft. Opens Tatlock pool.)

Scott County: W. L. Hartman 1 Rush, NW NW NE 10-19s-31w, IPP 153 BOPD, Arbuckle 5,050-54 ft. TD 5,078 ft. (Opens Grigsby pool. Westernmost Arbuckle production in Kansas.)

COLORADO

Morgan County: Rocky Mountain Standard and Midwest Oil Co. 1 Poe, SE SE NW 12-3n-59w. IPP 10 BOPD, "D" sand discovery, new field. TD 5,952 ft.

Washington County: Vaughey & Vaughey 1 Downing, NE NE NE 34-1s-56w. IPP 148 BOPD, "D" sand discovery, new field. TD 5,257 ft.

SASKATCHEWAN

Canso-Pan Western 10-12 Hoosier, LSD 10, 12-31-27w3. Viking gas well. TD 2,465 ft.

Dome-Cox-Imperial 9-27 West Midale, LSD 9, 27-6-11w2. Charles oil well. TD 4,651 ft.

Socony-Woodley-Southern 30-14 Tompkins, LSD 14, 30-13-20w3. Shaunavon gas well.

ALBERTA

Imperial 1-33-39-5 Leslieville, LSD 1, 33-39-5w5. Indicated Cardium oil well. TD 7,101 ft.

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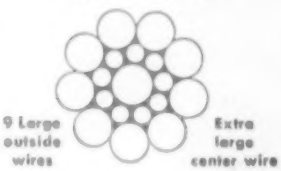

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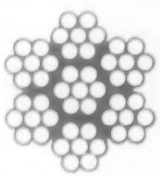

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